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DANIEL C. ROPER, Secretary

NATIONAL BUREAU OF STANDARDS
LYMAN J. BRIGGS, Director

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STANDARD TIME THROUGHOUT THE WORLD

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STANDARD TIME THROUGHOUT THE WORLD[1]

ABSTRACT

This Circular is a revision and enlargement of Circulars 280 and 399, which it supersedes and which bore the same title. It gives a brief historical sketch of the development of the standard time system, time-zone maps of the United States and of the world, a list of stations transmitting radio time signals, a list of the times used in several large cities, a list of the legal times used in most of the countries of the world, and other information regarding standard time.

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I. INTRODUCTION

The development, within the last few years, of means of international communication such as international news service, world-wide telephony, transoceanic aviation, exploration, and radio broadcasting, has brought about an increased consciousness of the difference in time between different geographic centers. The demand for information regarding time used in different parts of the world led to the publication in 1925 of Bureau of Standards Circular 280, "Standard Time Throughout the World". This was revised in 1932 as Circular 399 with the same title. Since then, changes have been made in the times of several localities. The present Circular includes these changes, gives additional information regarding the use of legal time, and supersedes the two former Circulars.

Every effort has been made to give the latest information, and the data are believed to have been the best available at the time this Circular was prepared.

[1] Prepared by Ralph E. Gould, Chief, Time Section.

II. HISTORICAL SKETCH

From the earliest civilization man has reckoned time by the apparent motion of the heavenly bodies. The rotation of the earth on its axis from west to east causes these bodies to "rise" in the east and "set" in the west. Consequently points to the east of us have sunrise before we do, or, as we say, their time is faster than ours; while points to the west have time that is slower than ours. This rotation of the earth about its axis once in 24 hours gives a time change of 1 hour for every 15° of longitude. That is, if observations were made on the transit of the sun across the meridian at points separated by 15° of longitude, it would be found that the time of transit at two such points would differ by 1 hour. If the separation of the points of observation were decreased, the difference in time would be decreased in the same proportion. These times would all be true local times, using the transit of the sun across the meridian as a standard.

Since the distance around the earth is less at points not on the Equator than at the Equator the distance on the earth's surface corresponding to a time difference is also less in the same proportion. For example, at the Equator 15° corresponds to about 1,040 miles, while at the latitude of New York 15° corresponds to only about 784 miles. Or, at the Equator, a difference of about 17 miles makes a time difference of 1 minute, while in the latitude of New York a difference of only 13 miles makes a difference of 1 minute in true local time.

The need of a uniform time began to be felt in the United States about 1870, and the railroads gradually adopted a system for use on their roads specifying definite important centers or junction points at which changes of 1 hour should be made. As means of communication still further developed, it became apparent that some system of international time must be established.

In 1884 an international congress was called in Washington to consider the subject of a world standard of time. The world was divided into zones, each covering 15° of longitude, the time for each zone being that of the meridian passing through its approximate center and the time in adjacent zones differing by 1 hour. The meridian passing through the observatory at Greenwich, England, was chosen as the zero meridian from which all time should be reckoned. Although there was no definite agreement as to the adoption of this time by the different nations, the plan was gradually accepted.

The adoption of time differing from Greenwich by an odd number of half hours soon made its appearance. This slight departure from the original plan is of advantage in some places, since it more nearly agrees with true local time. In New Zealand the time is 11½ hours faster than Greenwich time, in Burma 6½ hours faster, while in India, excepting Calcutta, it is 5½ hours faster.

Table 1 shows the spread of the use of the International Time Zone System. In some countries, as in the United States, standard time came into use without any legislative action. The dates given are either those of official adoption or of the earliest recorded use of standard time.

TABLE 1.—*Showing increasing adoption of International Time Zone System*

Year	Month and day	Country
1868	November	New Zealand.
1879	September 1	Sweden.
1880		Great Britain.
1883		United States.
1888	January 1	Japan.
1891	October 1	Austria, Bulgaria, Hungary, Macedonia, Rumania, Servia.
1892		Cape Colony, Orange River, Transvaal.
	May 1	Belgium, Netherlands.[1]
1893	May 1	Germany.
	November 1	Italy.
1894	January 1	Denmark.
	June 1	Switzerland.
1895	February 1	Australia.
	May 1	Norway.
	September	Natal.
1896		China Coast, Hong Kong, Philippines.
	January 1	Formosa, Miyako, Pescadores, Yarayama.
1899	May 1	South Australia (changed to 9½ hours fast.)
1900		Turkey.
	October 1	Egypt.
1901	January 1	Spain.
1903		Union of South Africa (changed to 2 hours fast).
1904		Western Russia.
1905	July 1	India and Burma.
1906		Seychelles.
1907	January 1	Mauritius, Chagos Archipelago.
1908	July 28	Peru.
1911	January 1	French Guiana, Ivory Coast.
	March 9	France, Algeria.
	April 12	Tunisia.
	May 1	Martinique.
	May 15	Miquelon.
1911	June 8	Guadeloupe.
	July 1	French Somali Coast, Madagascar.
	July 18	French India.
	September	British Guiana.
1912	January 1	Dahomey, French Cameroun, French Congo, French Guinea, Mauretania, Niger Territory, Senegal.
	January 1	Portugal, Azores, Cape Verde, Macao, Madeira, Portuguese East Africa, Portuguese Guinea, Portuguese West Africa, Principe, St. Thomé, Uhyden.
	January 13	New Caledonia, New Hebrides.
	February 1	Jamaica.
	March	Anquilla, Antigua, Barbarda, Dominica, Monserrat, Nevis, St. Kitts, Tortola, Trinidad.
	March 2	Bahamas.
	April 1	British Honduras.
	May 1	Indo-China.
	October 1	French Oceania.
1914	January 1	Brazil.
1916	July 28	Greece.
	October 1	Ireland.
1918	September 1	Chile.
1919	September 1	Nigeria.
	September 16	Poland.
1920	April 1	Siam.
	May 1	Argentina, Uruguay.
1921	January 15	Costa Rica, Nauru.
1924		U. S. S. R.
1930		Mexico.
1932		Netherlands India.
1933	April 1	Gambia.

[1] Netherlands changed to Amsterdam time in 1903.

III. STANDARD TIME IN THE UNITED STATES

1. TIME ZONES

Although the United States has used standard time since 1883, no legislative action for the country as a whole is recorded until March 19, 1918, when Congress directed the Interstate Commerce Commission to establish limits for the various time zones in this country. Changes in these boundaries have been made from time to time, in order that the time changes may occur at such points as to result in a minimum of inconvenience.

The United States is divided into four standard time zones, each approximately 15° of longitude in width. All places in each zone use, instead of their own local time, the time counted from the transit of the "mean sun" [2] across the meridian which passes through the approximate center of that zone.

These time zones are designated as Eastern, Central, Mountain, and Pacific, and the time in these zones is reckoned from the 75th, 90th, 105th, and 120th meridians west of Greenwich, respectively.

[2] The interval between successive passages of the sun across the meridian is somewhat variable, and for this reason apparent solar days are unequal. Therefore, mean time has been adopted, which is kept by a fictitious or "mean sun" moving uniformly in the Equator at the same average speed as that of the real sun, thus making days of equal length. It is "mean noon" when this "mean sun" crosses the meridian.

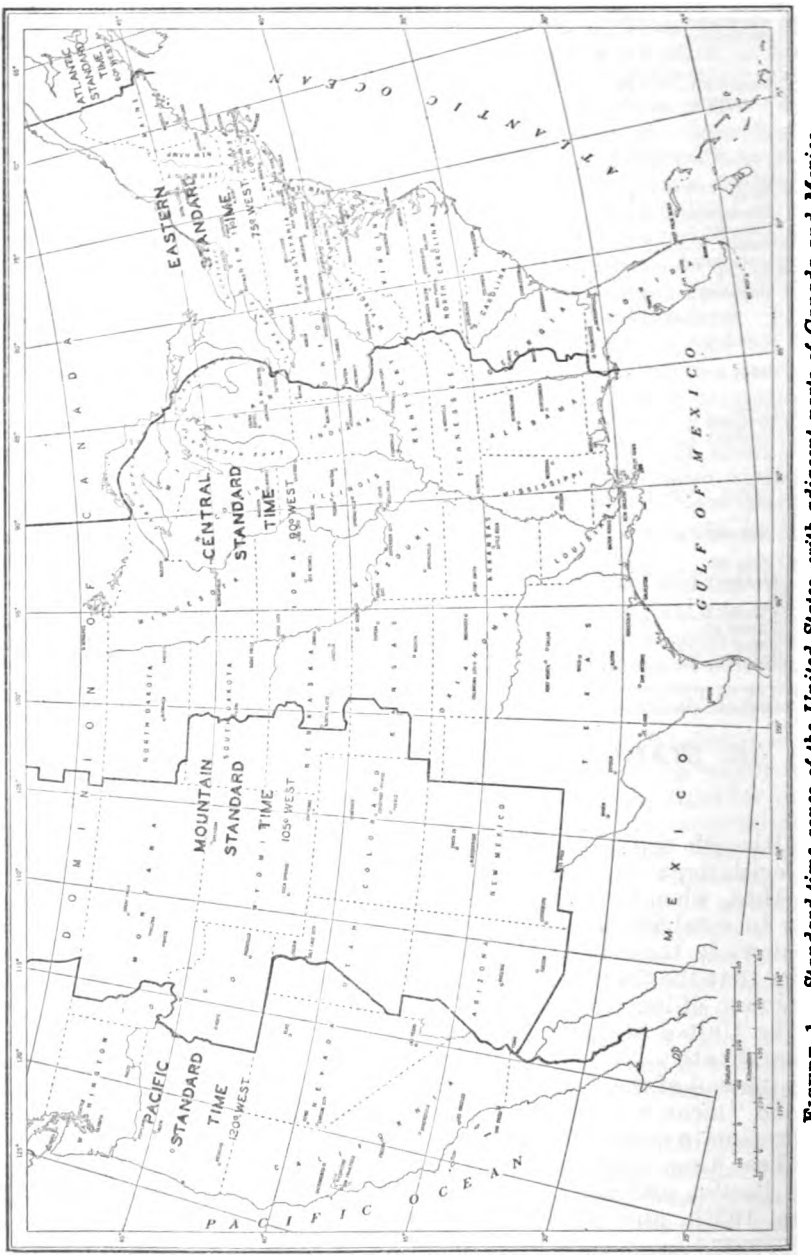

FIGURE 1.—*Standard time zones of the United States, with adjacent parts of Canada and Mexico*

The time in the various zones is slower than Greenwich time by 5, 6, 7, and 8 hours, respectively.

The question of changing from the time of one time zone to that of an adjacent zone arises in practice largely in the operation of railroads. Because of the inconvenience of changing the time by the necessary amount of 1 hour at every point where a railroad crosses one of these boundary lines, the more convenient practice has usually been followed of making the change at some terminal or division point on the road, at some junction point, or at the boundary line between the United States and Canada. The result is that practically the boundaries of the time zones are defined by the lines connecting these points of railroad time change. Because of the location of these railroad junctions or terminals the resulting lines are somewhat irregular.

Figure 1 shows the time zones and present boundary lines as defined by the Interstate Commerce Commission.

2. CITIES ON TIME-ZONE BOUNDARIES

There are listed below some of the more important cities on the boundaries of the time zones.

(*a*) The following municipalities located on the boundary between the Eastern and the Central Time Zones use eastern standard time:

Detroit, Mich.
Toledo, Ohio, and all other cities in Ohio situated on this boundary.
Williamson, W. Va.
Dungannon, Va.
Bristol, Va.
Asheville, N. C.
Franklin, N. C.
McDonough, Ga.
Macon, Ga., and points on Southern Railway between McDonough and Macon.
Perry, Ga.
Thomasville, Ga.
Apalachicola, Fla.

All other places on this boundary use central standard time.

(*b*) The following municipalities located on the boundary between the Central and the Mountain Time Zones use central standard time:

Murdo, S. Dak.
Mackenzie, S. Dak.
Phillipsburg, Kans.
Stockton, Kans.
Plainville, Kans.
Ellis, Kans.
Liberal, Kans.

All other places on this boundary use mountain standard time.

(*c*) All municipalities on the boundary between the Mountain and the Pacific Time Zones use mountain standard time except Huntington, Oreg., which uses Pacific standard time.

3. TERRITORIES AND INSULAR POSSESSIONS

Standard time is also used in the territories outside of the continental United States. The places and the time used are given below:

Alaska (see table 4)	10 hours slower than Greenwich.
Guam	9½ hours faster than Greenwich.
Hawaii	10½ hours slower than Greenwich.
Panama Canal Zone	5 hours slower than Greenwich.
Philippines	8 hours faster than Greenwich.
Puerto Rico	4 hours slower than Greenwich.
Samoa	11 hours slower than Greenwich.
Virgin Islands	4 hours slower than Greenwich.

4. TIME IN SEVERAL LARGE CITIES OF THE UNITED STATES AT 12 NOON, EASTERN STANDARD TIME

Atlanta, Ga	11:00 a. m.	Milwaukee, Wis	11:00 a. m.
Baltimore, Md	12:00 noon.	Minneapolis, Minn	11:00 a. m.
Birmingham, Ala	11:00 a. m.	Newark, N. J	12:00 noon.
Boston, Mass	12:00 noon.	New Haven, Conn	12:00 noon.
Charleston, S. C	12:00 noon.	New Orleans, La	11:00 a. m.
Chicago, Ill	11:00 a. m.	New York, N. Y	12:00 noon.
Cincinnati, Ohio	12:00 noon.	Norfolk, Va	12:00 noon.
Cleveland, Ohio	12:00 noon.	Omaha, Nebr	11:00 a. m.
Columbus, Ohio	12:00 noon.	Philadelphia, Pa	12:00 noon.
Dallas, Tex	11:00 a. m.	Pittsburgh, Pa	12:00 noon.
Denver, Colo	10:00 a. m.	Portland, Oreg	9:00 a. m.
Des Moines, Iowa	11:00 a. m.	Providence, R. I	12:00 noon.
Detroit, Mich	12:00 noon.	Richmond, Va	12:00 noon.
Hartford, Conn	12:00 noon.	Rochester, N. Y	12:00 noon.
Houston, Tex	11:00 a. m.	Salt Lake City, Utah	10:00 a. m.
Indianapolis, Ind	11:00 a. m.	San Francisco, Calif	9:00 a. m.
Kansas City, Mo	11:00 a. m.	Seattle, Wash	9:00 a. m.
Los Angeles, Calif	9:00 a. m.	St. Louis, Mo	11:00 a. m.
Louisville, Ky	11:00 a. m.	St. Paul, Minn	11:00 a. m.
Memphis, Tenn	11:00 a. m.	Washington, D. C	12:00 noon.

5. TIME SIGNALS IN UNITED STATES

The standard time for the United States is derived from star observations made at the United States Naval Observatory, Washington, D. C. After the necessary corrections have been applied, signals from a transmitting device are sent by wire to the radio stations at Arlington, Va., (NAA), and Annapolis, Md., (NSS), where they are automatically broadcast by radio.

All naval time signals are made in a standard manner, which is as follows:

The signals begin 5 minutes before the hour and consist of a dash on each second, except on the seconds listed below:

55 minutes; 29, 51, and 56 to 59 seconds.
56 minutes; 29, 52, and 56 to 59 seconds.
57 minutes; 29, 53, and 56 to 59 seconds.
58 minutes; 29, 54, and 56 to 59 seconds.
59 minutes; 29, and 51 to 59 seconds.

Beginning exactly on the hour a much longer dash is sent. In all cases the exact second is denoted by the beginning of the dash, the end being without significance. It will be noted that the number of seconds sounded immediately following the single second omission and preceding the long omission at the end of each minute indicates the number of minutes of the signal yet to be sent. For instance, the signal for 56 minutes and 52 seconds is omitted and then 3 seconds are sounded, indicating that 3 minutes of the signal remain to be transmitted.

These time signals, if received directly and automatically are seldom in error by as much as 0.10 second. The average error is generally less than 0.02 second.

The signals from San Francisco, Calif., (NPG), are broadcast from a clock, located at Mare Island, which is first synchronized with the signals from Arlington.

Darien, Canal Zone (NBA), and Honolulu, T. H. (NPM), relay the signals received from Arlington.

Cavite, P. I. (NPO), transmits signals from a clock at the Manila Central Observatory. These signals are independent of Arlington, and the errors may be somewhat greater than for the other stations.

All of these signals are sufficiently close for ordinary commercial use.

Table 2 gives a list of the official naval stations which broadcast the time signals and the time of broadcast.

TABLE 2.—*Radio transmission of official time signals* [1]

[The times given in this table are those of the final signal of the series]

Station	Call letters	Frequency	Time of transmission	
			Greenwich civil time [2]	Standard time of the station
		Kilocycles 113	Each hour except 9 and 11 a.m. and 9 and 11 p.m., eastern standard time.	
		690	3^h, 17^h	12 noon, 10 p. m.
		4,525	5^h	12 midnight.
Arlington, Va.	NAA	8,410	17^h	12 noon.
		9,050	0^h, 3^h, 8^h, 21^h	3 a. m., 4 p. m., 7 p. m., 10 p. m.
		12,615	17^h	12 noon.
		16,820	17^h	12 noon.
Annapolis, Md.	NSS	17.8	0^h, 3^h, 5^h, 8^h, 17^h, 21^h	3 a. m., 12 noon, 4 p. m., 7 p. m., 10 p. m., 12 midnight.
		22.9	13^h	9 p. m.
		56	4^h 30^m	12:30 p. m.
Cavite, P. I. (Los Banos)	NPO	8,872	4^h 30^m	12:30 p. m.
		9,050	13^h	9 p. m.
		17,744	4^h 30^m	12:30 p. m.
Darien, C. Z. (Balboa)	NBA	46	3^h, 8^h, 17^h	3 a. m., 12 noon, 10 p. m.
Honolulu, T. H. (Pearl Harbor).	NPM	8,090	8^h, 17^h	1:30 a. m., 9:30 p. m.
		16,180	3^h	4:30 p. m.
San Francisco, Calif. (Mare Island).	NPG	42.8	3^h, 8^h, 17^h	9 a. m., 7 p. m., 12 midnight.
		108	3^h, 8^h, 17^h	9 a. m., 7 p. m., 12 midnight.
		8,590	8^h	12 midnight.
		12,885	3^h, 17^h	9 a. m., 7 p. m.

[1] The information given in this table is as of October 1934, and is subject to change by the U. S. Navy Department.

[2] The U. S. Naval Observatory issues its reports in Greenwich civil time and numbers the hours of the day from 1 to 24, beginning at 12 midnight.

IV. TIME IN FOREIGN COUNTRIES

1. TIME ZONES OF THE WORLD

Standard time for the world, like longitude, is counted from Greenwich as the prime meridian. As explained in section II, places to the east of Greenwich have faster time then Greenwich, while places to the west have slower time.

Figure 2 shows how the world is divided into time zones of approximately 15° for every hour. Since Greenwich is in the 0 zone, the number of any zone in figure 2, if added algebraically to the time in Greenwich, will give the corresponding time in that particular zone. It must be remembered that not all countries follow the International Time Zone System, but that some use the time of some principal city as a standard and others have no standard of time. Table 4 and figure 3 will be found useful in such cases.

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2. INTERNATIONAL DATE LINE

The International Meridian Conference, held in Washington, D. C., in 1884, established as the prime meridian, from which time was to be counted, the meridian passing through Greenwich, England. The meridian 180° from this prime meridian was made the International Date Line, but, in order to include islands of the same group in the same day, it has been necessary to vary the line from the 180th meridian at some places. The official date line runs from 70° N. to 60° S. in accordance with the following description:

Starting at the 180th meridian at 70° N., thence
southeasterly to 169° W., 65° N., thence
southwesterly to 170° E., 52°30′ N., thence
southeasterly to the 180th meridian at 48° N., thence
southerly on the 180th meridian to 5° S., thence
southeasterly to 172°30′ W., 15°30′ S., thence
southwesterly to the 180th meridian at 51° 30′ S., thence
southerly on the 180th meridian to 60° S.

When crossing this line in a westerly direction (i. e., from west longitude to east longitude), the date must be advanced 1 day, and when crossing in an easterly direction (east longitude to west longitude), the date must be set back 1 day.

3. TIME IN SEVERAL IMPORTANT CITIES

The following list gives the time in some important cities of the world, outside of continental United States, at 12 noon eastern standard time.

Alexandria, Egypt	7 p. m.
Athens, Greece	7 p. m.
Baghdad, Iraq	8 p. m.
Bangkok, Siam	12 midnight.
Batavia, Java	12:30 a. m. next day.
Berlin, Germany	6 p. m.
Bombay, India	10:30 p. m.
Brussels, Belgium	5 p. m.
Bucharest, Rumania	7 p. m.
Buenos Aires, Argentina	1 p. m.
Cape Town, South Africa	7 p. m.
Caracas, Venezuela	12:30 p. m.
Copenhagen, Denmark	6 p. m.
Dawson, Yukon	8 a. m.
Edmonton, Alberta	10 a. m.
Freetown, Sierra Leone	4 p. m.
Geneva, Switzerland	6 p. m.
Halifax, Nova Scotia	1 p. m.
Havana, Cuba	12 noon.
Hong Kong, China	1 a. m. next day.
Honolulu, Hawaii	6:30 a. m.
Lima, Peru	12 noon.
London, England	5 p. m.
Madrid, Spain	5 p. m.
Manila, Philippine Islands.	1 a. m. next day.
Mexico City, Mexico	11 a. m.
Montevideo, Uruguay	1:30 p. m.
Montreal, Quebec	12 noon.
Paris, France	5 p. m.
Perth, Western Australia	1 a. m. next day.
Rio de Janeiro, Brasil	2 p. m.
Rome, Italy	6 p. m.
Shanghai, China	1 a. m. next day.
Sydney, New South Wales.	3 a. m. next day.
Tokyo, Japan	2 a. m. next day.
Valpariso, Chile	12 noon.
Vancouver, British Columbia.	9 a. m.
Vienna, Austria	6 p. m.
Wellington, New Zealand.	4:30 a. m. next day.
Winnepeg, Manitoba	11 a. m.

4. FOREIGN TIME SIGNALS

Several foreign radio stations broadcast official time signals at stated times each day, the time of transmission varying for the different stations.

In some countries the hours of the day are numbered from 0 to 24 beginning at midnight. This is less confusing than the double 12 system used in this country and is the system used in the list given below. The corresponding times in the two systems are:

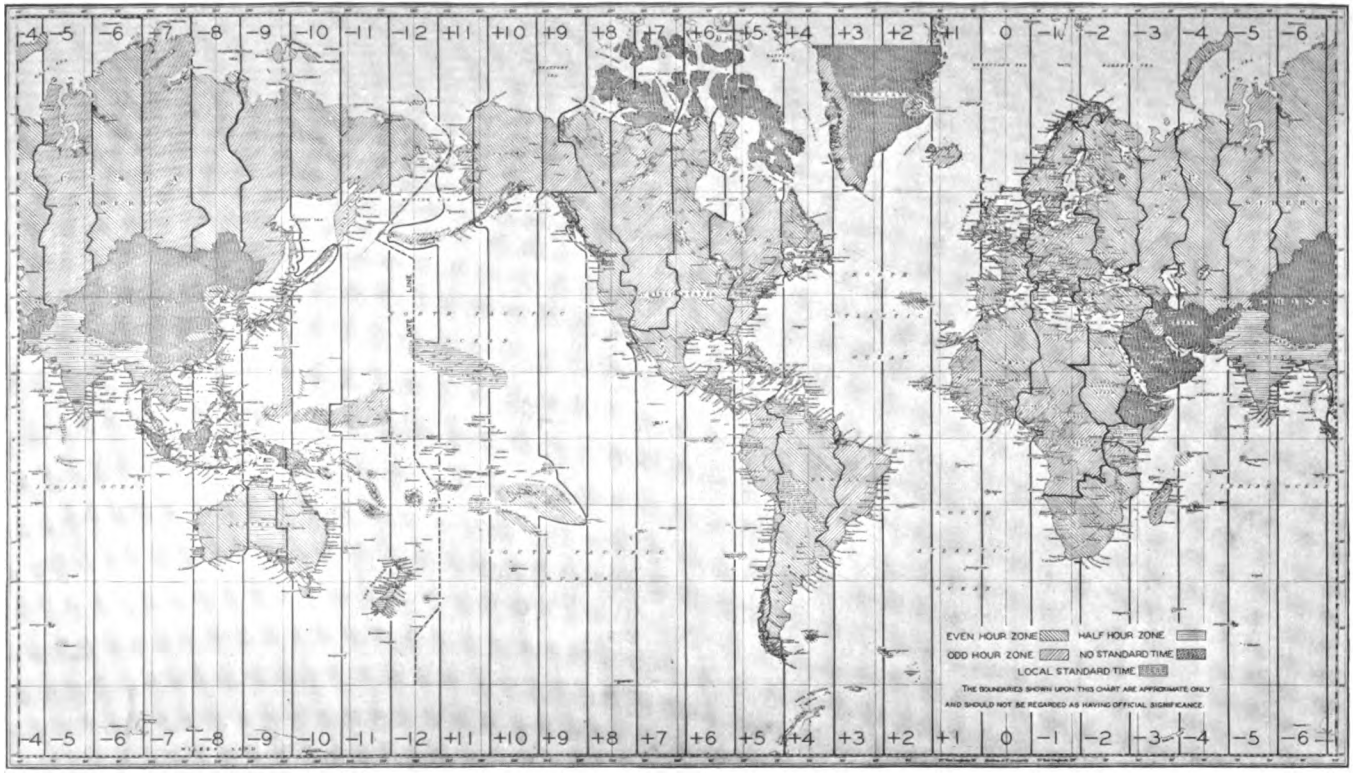

FIGURE 2.—*Standard time zones of the world.*

East longitude is marked plus (+), and west longitude is marked minus (−). The numbers are the hour differences from Greenwich.

24-hour system	Double-12 system	24-hour system	Double-12 system
1	1 a. m.	13	1 p. m.
2	2 a. m.	14	2 p. m.
3	3 a. m.	15	3 p. m.
4	4 a. m.	16	4 p. m.
5	5 a. m.	17	5 p. m.
6	6 a. m.	18	6 p. m.
7	7 a. m.	19	7 p. m.
8	8 a. m.	20	8 p. m.
9	9 a. m.	21	9 p. m.
10	10 a. m.	22	10 p. m.
11	11 a. m.	23	11 p. m.
12	12 noon.	0 or 24	12 midnight.

The systems of transmitted signals used by the different stations are not the same. A few stations use a special system of their own, but most stations use one of the systems described below. The signals are preceded by warning or some kind of preliminary signals to indicate the station.

The International System of Time Signals is as follows:

$57^m\ 0^s$ to $57^m\ 49^s$ the letter X (— . . —) repeated every 5 seconds

$57^m\ 50^s$ to $57^m\ 55^s$ silent period

$57^m\ 55^s$ to $58^m\ 0^s$ 55 56 57 58 59 0

$58^m\ 8^s$ to $58^m\ 10^s$ 08 09 10 ·

$58^m\ 18^s$ to $58^m\ 20^s$ 18 19 20 ·

$58^m\ 28^s$ to $58^m\ 30^s$ 28 29 30 ·

$58^m\ 38^s$ to $58^m\ 40^s$ 38 39 40 ·

$58^m\ 48^s$ to $58^m\ 50^s$ 48 49 50 ·

$58^m\ 50^s$ to $58^m\ 55^s$ silent period

$58^m\ 55^s$ to $59^m\ 0^s$ 55 56 57 58 59 0

$59^m\ 6^s$ to $59^m\ 10^s$ 06 07 08 09 10 ·

$59^m\ 16^s$ to $59^m\ 20^s$ 16 17 18 19 20 ·

$59^m\ 26^s$ to $59^m\ 30^s$ 26 27 28 29 30 ·

$59^m\ 36^s$ to $59^m\ 40^s$ 36 37 38 39 40 ·

$59^m\ 46^s$ to $59^m\ 50^s$ 46 47 48 49 50 ·

$59^m\ 50^s$ to $59^m\ 55^s$ silent period

$59^m\ 55^s$ to $0^m\ 0^s$ 55 56 57 58 59 0

The New International System is the same as the International System except that the 3 dashes from 55^s to 0^s are replaced by 6 dots 1 second apart, thus, 55 56 57 58 59 0.

TABLE 3.—*Radio transmission of foreign time signals*

[The times shown in this table are those of the final signal. The system of signals is preceded by warning or identifying signals in each case. The signals are transmitted daily unless otherwise noted.]

Country	Station	Call letters	Frequency	Time of transmission		Type of signal system	Controlled by—
				Greenwich civil time	Standard time of the station		
Europe:			*Kilocycles*	*Hours*	*Hours*		
England	Rugby	GBR	16	10 and 18	10 and 18	Rhythmic	
France	Bordeaux-Croix d'Hins	FYL	15.66	8 and 20	8 and 20	New International, followed by Rhythmic	Paris Obs.
	Paris-Eiffel Tower	FLE	113	9:30 and 22:30	9:30 and 22:30	do	De
	Paris-Pontoise	FYB	10,580	8 and 20	8 and 20	do	Do.
Germany	Nauen	DFY	16.55	0 and 12	1 and 13	International, followed by Rhythmic	Deutschen Seewerte.
	Norddeich	DAN	11,340	0 and 12	1 and 13	do	
Italy	Rome	IRO	680	19:30	20:30	Special	Campidoglio Obs.
Portugal	Mansanto	CTV	125	9:40	9:40	do	Lisbon Obs.
			500	9:30	9:30		
			9,090	10:17 [1]	10:17 [1]		
			11,539	10:17 [1]	10:17 [1]		
Spain	San Fernando, Cadiz	EBC	430	13 [2]	13 [2]	International	San Fernando Obs.
Sweden	Stockholm	SBA	689	12	13	do	Nauen signal (DFY).
U. S. S. R	Archangel	RGE	375	13	15	Special	Hand transmission.
	Feodosia	REK	500	12:05	14:05	do	Do.
	Leningrad-Podbelskogo	RET	78.5	22	0	Special, followed by Rhythmic	Pulkovo Obs.
	Moscow-Oktaybrskaye	RAI	39	21	23	do	
			5,769	16	18		
Asia:							
Ceylon	Colombo	VPB	130.4	6	11:30	International	Colombo Obs.
			500	17	22:30		
China	Cape d'Aquilar, Hong Kong	VPS	150	2 and 13	10 and 21	Special	Royal Obs., Hong Kong.
	Peiping (Peking)	XPK	214.3	1 and 11	9 and 19	do	Central Obs., Peiping.
	Shanghai	FFZ	500	3 and 9	11 and 17	New International	Zi-Ka-Wei Obs.
	Shanghai (Zi-Ka-Wei) Obs.	8ZW	12,820	3 and 9	11 and 17	do	Do.
	Tsingtao	XORT	7,140	0:30 and 10:30	8:30 and 18:30	Special	
India	Calcutta	VWC	150	8:30 and 16:30	14 [3] and 22 [3]	International	Alipore Obs.
	Peshawar	VWP	166.7	5:30	11	Special	
Indo-China	Kien an	FRK	500	3	10	do	Fu Lien Obs.
	Saigon	FZA	18.9	19	2	Modified Rhythmic	
	Saigon	FZR	9,520	19	2	do	
Iraq	Basra	YIB	500	11	14	Special	

Japan	Choshi	JCS	500	2:04 [4] and 12:04 [4]	11:04 [4] and 21:04 [4]	do	Astronomical Obs., Tokyo.
	Okayama	JOKK	700	3 and 12:40	12 and 21:40	do	Tokyo Central Broadcasting Station.
	Shizuoka	JOPK	780	3 and 12:40	12 and 21:40	do	Do.
	Tokyo (Funabashi)	JJC	39	1:04 [4] and 12:04 [4]	11:04 [4] and 21:04 [4]	Special, preceded by Rhythmic.	Astronomical Obs.
Africa:							
Eritrea	Massawa	IRG	117.4 5,454	4 and 18 18	7 and 21 21	Special	Pendulum and chronometer checked against Bordeaux (FYL).
Italian Somaliland	Magadiscio (Mogdishu)	ISG	153.8 5,450	9 and 22 22:10	12 and 1 1:10	do do	Pendulum checked against Bordeaux (FYL).
Portuguese East Africa.	Polona (Lorenço Marques)	CRAP	125	8 and 19	10 and 21	New International	Campos Rodriques Obs.
	Ponta Vermelha (Lorenço Marques).	CQE	500	8 and 19	10 and 21	do	Do.
Union of South Africa	Capetown	ZTC	800	21	23	do	Royal Obs.
	Slangkop (Capetown)	ZSC	480	21	23	do	Do.
North America:							
Canada	Chebucto Head, N. S	VAV	500	14	10	Special	St. Johns Obs.
	Gonzales Hill, B. C	VAK	405	3 and 18	10 and 17	do	Gonzales Obs.
Mexico	Mexico City (Chapultepec)	XDA	51.7	1 and 19 [4]	12 [4] and 18	U. S	Tacubaya Obs.
South America:							
Argentina	Buenos Aires–Darsena Norte	LOL	285 8,690	2 [5] and 14 [5 6] 2 and 14 [5 6]	10 [5] and 22 [5 6] 10 and 22 [5 6]	New International	Buenos Aires Naval Obs.
	Monte Grande	LSD LSF	8,830 19,600	23:45 11:45	19:45 7:45	Modified Rhythmic do	
Brazil	National Obs. (Rio de Janiero).	PPE	8,720.9	0 [4] 0:10 [4] 0:20 [4]	21 [4] 21:10 [4] 21:20 [4]	New International U. S Special	Rio de Janiero Obs.
	Rio de Janiero	PPR	300	0 [4]	21 [4]	New International	Do.
Chile	Valpariso–Las Salinas	CCL	140	1 [2]	20 [2]	U. S	Hydrographic Office.
Peru	La Punta (Callao)	OBE	250 13,043	19 [2] 19 [2]	14 [2] 14 [2]	Old U. S	Naval School of Peru.
	Lima–El Progreso	OAZ	85.7	19 [2]	14 [2]	do	Do.
Australia and East Indies:							
Australia	Adelaide, S. A	VIA	500	0:30 and 12:30	10 and 22	International	Adelaide Obs.
	Melbourne, Victoria	VIM	500	2 and 14	0 and 12	New International.	
	Perth, W. A	VIP	500	1 and 13	9 and 21	International	Perth Obs.
	Sidney, N. S. W	VIS	500	3 and 11	13 and 21	Special	Sidney Obs.
Java	Malabar	PKX	19	1 [2]	8:30 [2]	International	
		PLA	19	1 [7]	8:30 [7]	do	
		PLO	14,440	1	8:30	do	
New Zealand	Dominion Obs. (Wellington)	ZLY	500	9 [8] and 23	20:30 [8] and 10:30	Special	Dominion Obs.
	Wellington	ZLW	500	9 [8] and 23	20:30 [8] and 10:30	do	Station ZLY.
Sarawak	Kuching	VQF	193	0	7:30	do	

[1] Time signals start at 10 hours.
[2] Signals not sent on Sundays.
[3] Indian standard time.
[4] Signals not sent Sundays and holidays.
[5] Sundays and holidays only.
[6] From Nov. 1 to Mar. 1 the signals are sent 1 hour earlier.
[7] Signals sent Sundays only.
[8] Tuesdays and Fridays only, except on holidays.

The United States System is described on page 6.

The Rhythmic System, sometimes called the coincidence, the scientific, or the vernier system, consists of a series of 61 evenly spaced dots each minute for 5 minutes, making a total of 305 dots in 300 seconds. This system is sometimes modified by replacing the final dot of each minute by a dash.

Table 3, compiled from authoritative sources, lists a number of foreign stations which transmit time signals. When signals end at times other than on the hour, they start the necessary number of seconds ahead of the final signal.

5. COMPARATIVE TIME

In order to illustrate more clearly the difference in time as one travels from place to place upon the earth, the chart shown in figure 3 has been prepared. On this chart the outer circle shows the longitude east and west of Greenwich; the middle circle gives the time as compared with noon in Washington, D. C., and the inner circle shows the time difference from Greenwich.

This diagram will be found useful in picturing the relative locations of various countries and for computing the comparative time between them.

Example: The standard meridian for Japan is 135° E. and that for Turkey is 30° E. What is the time in each place at noon in Washington and what is the time difference between Japan and Turkey?

Following the radius through 135° E. toward the center, we find that the time in Japan is 9 hours faster than Greenwich and that its time is 2 a. m. next day when it is noon in Washington.

Following the radius through 30° E. toward the center, we find that the time for Turkey is 2 hours faster than Greenwich and that its time is 7 p. m. when it is noon in Washington.

Since Japan is 9 hours faster than Greenwich and Turkey is only 2 hours faster than Greenwich, Japan must be 9 hours minus 2 or 7 hours faster than Turkey.

Where parts of an hour are involved the fraction may be added to the full hour difference shown in the diagram.

Example: What is the time in Honolulu (157°30′ W.) at noon in Washington and how much difference is there in time between Honolulu and England?

Following the outer circle we find that 157°30′ W. is halfway between 150° W. and 165° W. The time of Honolulu must then be half way between the time for the two meridians. The middle circle shows that this would give the time in Honolulu as 6:30 a. m. at noon in Washington, and the inner circle shows that Honolulu time is 10½ hours slower than Greenwich.

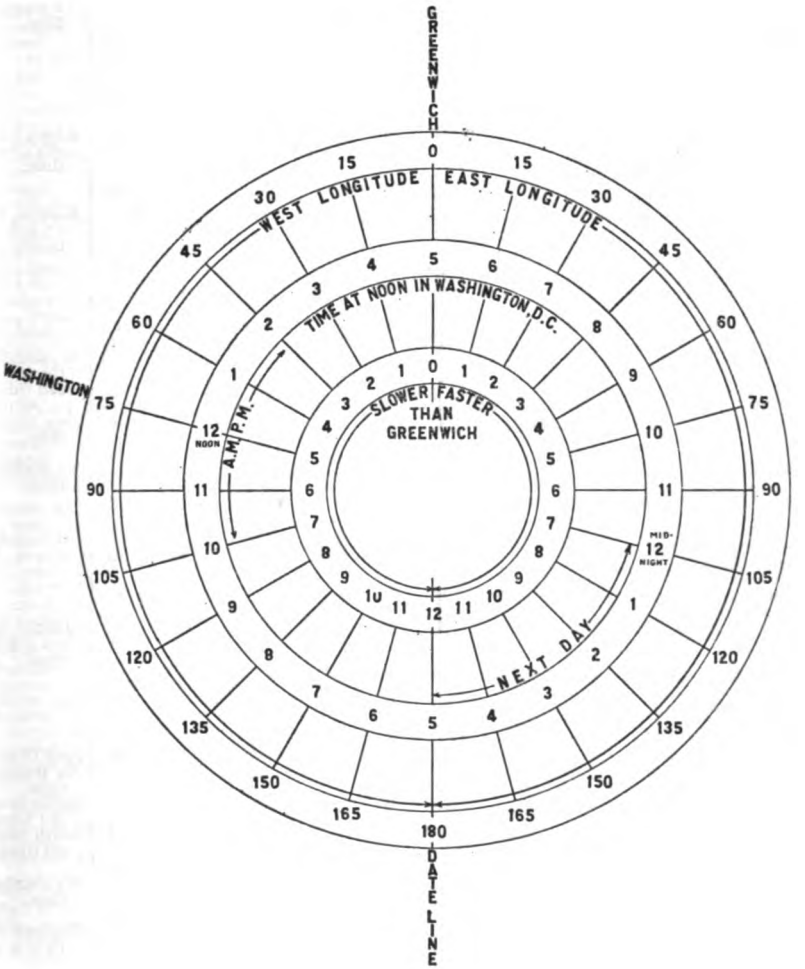

FIGURE 3.—*Comparative time chart.*

6. LEGAL TIME USED IN THE DIFFERENT COUNTRIES

Nearly every country of the world has established a legal time upon which to operate, and also a legal time for islands and dependencies under its control. (See fig. 2.) Table 4 shows the authorized time and compares this time with both Greenwich, England, and Washington, D. C. Where the legal time conforms to the International Standard Time System the standard-time meridian is indicated.

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*

Country	General location	Standard meridian	Time compared with Greenwich	Noon at Washington, D. C. (eastern standard time)	Remarks
			h m s	h m s	
Admiralty Islands	South Pacific	150° E.	10 fast	3 [1] a. m.	
Afghanistan	Asia (65° E.)				No standard time.
Alaska [2]	North America				
Ketchikan		120° W.	8 slow	9 a. m.	
Cordova, Juneau, Sitka, Southern portion		135° W.	9 slow	8 a. m.	
Central portion		150° W.	10 slow	7 a. m.	Alaskan standard time.
Aleutian Islands, West coast		165° W.	11 slow	6 a. m.	
Albania	Europe	15° E.	1 fast	6 p. m.	Middle European time.
Algeria	Africa	0°	0	5 p. m.	
Amirante Islands	Indian Ocean	60° E.	4 fast	9 p. m.	
Andaman Islands	do	97°30′ E.	6 30 fast	11 30 p. m.	
Angola	Africa	15° E.	1 fast	6 p. m.	
Anguilla Island	West Indies	60° W.	4 slow	1 p. m.	
Antigua Island	do	60° W.	4 slow	1 p. m.	
Arabia	Asia (45° E.)				No standard time.
Aden			2 59 54 fast	7 59 54 p.m.	Aden time.
Argentina	South America	60° W.	4 slow	1 p. m.	
Aru Islands	East Indies	135° E.	9 fast	2 a. m.	New Guinea time.
Ascension Island	South Atlantic	15° W.	1 slow	4 p. m.	
Auckland Island	South Pacific (165° E.).				No standard time
Austral (Tubuai) Islands	South Pacific	150° W.	10 slow	7 a. m.	
Australia	do				
Western Australia		120° E.	8 fast	1 [1] a. m.	
Northern Territory, South Australia, New South Wales, Queensland, Victoria		142°30′ E.	9 30 fast	2 30 [1] a. m.	
		150° E.	10 fast	3 [1] a. m.	
Austria	Europe	15° E.	1 fast	6 p. m.	Middle European time.
Azore Islands	North Atlantic	30° W.	2 slow	3 p. m.	
Bahama Islands	North Atlantic	75° W.	5 slow	12 noon.	
Balearic Islands	Mediterranean Sea.	0°	0	5 p. m.	
Bali Island	East Indies	112°30′ E.	7 30 fast	12 30 [1] a. m.	Java time.
Balleny Islands	Antarctic Ocean (162° E.).				No standard time.
Baluchistan	India	82°30′ E.	5 30 fast	10 30 p. m.	Indian standard time.
Bangka Island	East Indies	105° E.	7 fast	12 midnight.	South Sumatra time.
Barbados Island	West Indies	60° W.	4 slow	1 p. m.	
Bear Island	Arctic Ocean (20° E.).				No standard time.
Bechuanaland	Africa	30° E.	2 fast	7 p. m.	
Belgium	Europe	0°	0	5 p. m.	Western European time.
Bennett Island	Arctic Ocean	150° E.	10 fast	3 [1] a. m.	
Bermuda Islands	North Atlantic	60° W.	4 slow	1 p. m.	
Bessarabia	Europe	30° E.	2 fast	7 p. m.	Eastern European time.
Bhutan	India	82°30′ E.	5 30 fast	10 30 p. m.	Indian standard time.
Billiton Island	East Indies	105° E.	7 fast	12 midnight.	
Bolivia	South America		4 33 slow	12 27 p. m.	La Paz time.
Borneo	East Indies				
British North Borneo (Labuan).		120° E.	8 fast	1 [1] a. m.	
Dutch Borneo, Sarawak		112°30′ E.	7 30 fast	12 30 [1] a. m.	Java time.

[1] The time noted is in the morning of the following day.

[2] Although Congress has authorized only one time, that of 150° W., for Alaska, several times are used and recognized in commerce. The times used are given here.

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*—Continued

Country	General location	Standard meridian	Time compared with Greenwich	Noon at Washington, D. C. (eastern standard time)	Remarks
			h m s	h m s	
Brazil	South America				
Fernando Noronha Island		30° W.	2 slow	3 p. m.	
Isle da Trinidade					
Bahia					
Ceara					
Esperito Santo					
Goyaz					
Maranhao					
Minas-Geraes					
Para					
Parana		45° W.	3 slow	2 p. m.	
Parahyba					
Pernambuco					
Piauhy					
Rio de Janeiro					
Rio Grande do Norte					
Rio Grande do Sul					
Santa Catherina					
Sao Paulo					
Amazonas		60° W.	4 slow	1 p. m.	
Matto Grosso					
Acre Territory		75° W.	5 slow	12 noon	
Bulgaria	Europe	30° E.	2 fast	7 p. m.	Eastern European time.
Burma	Asia	97°30′ E.	6 30 fast	11 30 p. m.	
Cameroon	Africa				
British		15° E.	1 fast	6 p. m.	
French		15° E.	1 fast	6 p. m.	
Campbell Island	Antarctic Ocean (170° W.).				No standard time.
Canada and Newfoundland.	North America				
Belle Isle					
Labrador (coast)			3 31 slow	1 29 p. m.	St. Johns time.
Newfoundland					
Anticosti Island					
Cape Breton Island					
Magdalen Island					
New Brunswick		60° W.	4 slow	1 p. m.	Atlantic standard time.
Nova Scotia					
Prince Edward Island					
Quebec (east of 68° W.)					
Sable Island					
Melville Peninsula					
Ontario (east of 90° W.)		75° W.	5 slow	12 noon	Eastern standard time.
Quebec (west of 68° W.)					
Southampton Island					
Manitoba					
Northwest Territories (eastern)		90° W.	6 slow	11 a. m.	Central standard time.
Ontario (west of 90° W.)					
Alberta					
Northwest Territories (middle)		105° W.	7 slow	10 a. m.	Mountain standard time.
Saskatchewan					
British Columbia					
Northwest Territories (western)		120° W.	8 slow	9 a. m.	Pacific standard time.
Yukon		135° W.	9 slow	8 a. m.	Yukon standard time.
Arctic Islands	Arctic Ocean North of Canada.				
Axel Heiberg Island					
Baffin Island					
Banks Island					
Bathurst Island					
Boothnia Peninsula					
Borden Island					
Cornwallis Island					
Devon Island					No standard time.
Ellesmere Island					
Melville Island					
Prince of Wales land					
Prince Patrick Island					
Ringnes Island					
Somerset Island					
Victoria Island					

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*—Continued

Country	General location	Standard meridian	Time compared with Greenwich	Noon at Washington, D. C. (eastern standard time)	Remarks
			h m s	h m s	
Canary Islands	North Atlantic	15° W.	1 slow	4 p. m.	
Cape Verde Islands	do	30° W.	2 slow	3 p. m.	
Caroline Islands	South Pacific				
West of 154° E		150° E.	10 fast	3 [1] a. m.	
East of 154° E		165° E.	11 fast	4 [1] a. m.	
Cayman Islands	West Indies		5 25 36 slow	11 34 24 a. m.	
Celebes Islands	East Indies	120° E.	8 fast	1 [1] a. m.	Celebes time.
Ceram Island	do	127°30′ E.	8 30 fast	1 30 [1] a. m.	
Ceylon	Indian Ocean	82°30′ E.	5 30 fast	10 30 p. m.	Indian standard time.
Chad	Africa	15° E.	1 fast	6 p. m.	
Chagos Archipelago	Indian Ocean	75° E.	5 fast	10 p. m.	
Channel Islands	English Channel	0°	0	5 p. m.	
Chatham Island	South Pacific	172°30′ E.	11 30 fast	4 30 [1] a. m.	
Chile	South America	75° W.	5 slow	12 noon.	
China	Asia				
Interior					No standard time.
Hoihau, Luichow, Pakhoi		105° E.	7 fast	12 midnight.	
East Coast, Hong Kong, Macao		120° E.	8 fast	1 [1] a. m.	
Cocos Islands (Keeling)	Indian Ocean	97°30′ E.	6 30 fast	11 30 p. m.	
Colombia	South America	75° W.	5 slow	12 noon.	
Comoro Islands	Indian Ocean	45° E.	3 fast	8 p. m.	
Congo	Africa				
Belgian		15° E.	1 fast	6 p. m.	
French		15° E.	1 fast	6 p. m.	
Cook Islands	South Pacific (160° W.)		10 38 slow	6 22 a. m.	
Corsica Island	Mediterranean Sea.	0°	0	5 p. m.	
Costa Rica	Central America	90° W.	6 slow	11 a. m.	
Crete Island	Mediterranean Sea.	30° E.	2 fast	7 p. m.	
Cuba	West Indies	75° W.	5 slow	12 noon.	
Curacao Island	Caribbean Sea (69° W.).		4 36 slow	12 24 p. m.	
Cyprus Island	Mediterranean Sea.	30° E.	2 fast	7 p. m.	
Czechoslovakia	Europe	15° E.	1 fast	6 p. m.	Middle European time.
Dahomey	Africa	0°	0	5 p. m.	
Danzig	Europe	15° E.	1 fast	6 p. m.	Middle European time.
Denmark	do	15° E.	1 fast	6 p. m.	Do.
Dominica Island	West Indies	60° W.	4 slow	1 p. m.	
Dominican Republic	do		4 40 slow	12 20 p. m.	
Ecuador	South America				
Guayaquil			5 19 24 slow	11 40 36 a. m.	
Quito			5 14 6.7 slow	11 45 53.3 a. m.	
Egypt	Africa	30° E.	2 fast	7 p. m.	
Ellice Islands	South Pacific	180° E.	12 fast	5 [1] a. m.	
El Salvador	Central America	90° W.	6 slow	11 a. m.	
England	British Isles	0°	0	5 p. m.	Western European time.
Eritrea	Africa	45° E.	3 fast	8 p. m.	
Estonia	Europe	30° E.	2 fast	7 p. m.	Eastern European time.
Tallinn			1 38 57 fast	6 38 57 p. m.	
Ethiopia	Africa (40° E.)				No standard time.
Falkland Islands	South Atlantic	60° W.	4 slow	1 p. m.	
Faroe Islands	British Isles	0°	0	5 p. m.	Western European time.
Fernando Po Island	South Atlantic	0°	0	5 p. m.	
Fiji Islands	South Pacific	180° E.	12 fast	5 [1] a. m.	

[1] The time noted is in the morning of the following day.

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*—Continued

Country	General location	Standard meridian	Time compared with Greenwich	Noon at Washington, D. C. (eastern standard time)	Remarks
			h m s	h m s	
Finland (Soumi)	Europe	30° E.	2 fast	7 p. m.	Eastern European time.
Flores Island	East Indies	120° E.	8 fast	1 [1] a. m.	
Formosa Island (Taiwan)	China Sea	120° E.	8 fast	1 [1] a. m.	
France	Europe	0°	0	5 p. m.	Western European time.
Gabon	Africa	15° E.	1 fast	6 p. m.	
Galapagos Islands	South Pacific (90° W.).				No standard time.
Gambia	Africa	15° W.	1 slow	4 p. m.	
Germany	Europe	15° E.	1 fast	6 p. m.	Middle European time.
Gibraltar	do	0°	0	5 p. m.	Western European time.
Gilbert Islands	South Pacific	180° E.	12 fast	5 [1] a. m.	
Gold Coast	Africa	0°	0	5 p. m.	
Great Lyakhov Island	Arctic Ocean	135° E.	9 fast	2 [1] a. m.	
Greece	Europe	30° E.	2 fast	7 p. m.	Eastern European time.
Greenland	Arctic Ocean				
Interior					No standard time.
Scoresby Sound		30° W.	2 slow	3 p. m.	
Angmagssalik, Disko Island, Western coast		45° W.	3 slow	2 p. m.	
Grenada Island	West Indies	60° W.	4 slow	1 p. m.	
Guadeloupe Island	do	60° W.	4 slow	1 p. m.	
Guadalupe Island	North Pacific (120° W.).				No standard time.
Guam Island	North Pacific	150° E.	10 fast	3 [1] a. m.	Guam standard time.
Guatemala	Central America	90° W.	6 slow	11 a. m.	
Guiana	South America				
British			3 45 slow	1 15 p. m.	
Dutch			3 40 35 slow	1 19 25 p. m.	
French		60° W.	4 slow	1 p. m.	
Guinea	Africa				
French		15° W.	1 slow	4 p. m.	
Portuguese		15° W.	1 slow	4 p. m.	
Hainan Island	China Sea	105° E.	7 fast	12 midnight.	
Haiti, Republic of	West Indies	75° W.	5 slow	12 noon.	
Halmahera Island	East Indies	127°30′ E.	8 30 fast	1 30 [1] a. m.	
Hawaiian Islands	North Pacific	157°30′ W.	10 30 slow	6 30 a. m.	Hawaiian standard time.
Hebrides Islands	British Isles	0°	0	5 p. m.	Western European time.
Honduras	Central America	90° W.	6 slow	11 a. m.	
British Honduras		90° W.	6 slow	11 a. m.	
Hungary	Europe	15° E.	1 fast	6 p. m.	Middle European time.
Iceland	North Atlantic	15° W.	1 slow	4 p. m.	
India	Asia	82°30′ E.	5 30 fast	10 30 p. m.	Indian standard time.
Calcutta			5 53 20.8 fast	10 53 20.8 p. m.	
Chattagong			6 07 fast	11 07 p. m.	
French Establishments		82°30′ E.	5 30 fast	10 30 p. m.	Indian standard time.
Portuguese Goa		82°30′ E.	5 30 fast	10 30 p. m.	Do.
Indo-China	Asia	105° E.	7 fast	12 midnight.	
Iraq	do	45° E.	3 fast	8 p. m.	
Ireland	British Isles	0°	0	5 p. m.	Western European time.

[1] The time noted is in the morning of the following day.

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*—Continued

Country	General location	Standard meridian	Time compared with Greenwich		Noon at Washington, D. C. (eastern standard time)		Remarks
			h m s		h m s		
Isle of Man	British Isles	0°	0		5	p. m.	Western European time.
Isle of Pines	West Indies	75° W.	5	slow	12	noon.	
Italy	Europe	15° E.	1	fast	6	p. m.	Middle European time.
Ivory Coast	Africa	0°	0		5	p. m.	
Jamaica	West Indies	75° W.	5	slow	12	noon.	
Jan Mayen Island	Arctic Ocean (10° W.).						No standard time.
Japanese Empire	Asia	135° E.	9	fast	2	[1] a. m.	Japanese standard time.
Korea (Chosen)		135° E.	9	fast	2	[1] a. m.	Do.
Jappen Islands	East Indies	135° E.	9	fast	2	[1] a. m.	New Guinea time.
Java	do	112°30′ E.	7 30	fast	12 30	[1] a. m.	Java time.
Juan Fernandez Island	South Pacific	75° W.	5	slow	12	noon.	
Karaginski Island	Bering Sea	165° E.	11	fast	4	[1] a. m.	
Kei Islands	East Indies	135° E.	9	fast	2	[1] a. m.	New Guinea time.
Kenya	Africa	37°30′ E.	2 30	fast	7 30	p. m.	
Kodiak Island	Gulf of Alaska	150° W.	10	slow	7	a. m.	
Komandorski Islands	Bering Sea	165° E.	11	fast	4	[1] a. m.	
Kotelni Island	Arctic Ocean	135° E.	9	fast	2	[1] a. m.	
Kuril Islands	Japan	135° E.	9	fast	2	[1] a. m.	
Laccadive Islands	Indian Ocean	82°30′ E.	5 30	fast	10 30	p. m.	
Latvia	Europe	30° E.	2	fast	7	p. m.	Eastern European time.
Liberia	Africa		0 44	slow	4 16	p. m.	
Libia	do	15° E.	1	fast	6	p. m.	
Liechtenstein	Europe	15° E.	1	fast	6	p. m.	Middle European time.
Lithuania	do	15° E.	1	fast	6	p. m.	Do.
Lombok Island	East Indies	112°30′ E.	7 30	fast	12 30	[1] a. m.	Java time.
Lord Howe Island	South Pacific	150° E.	10	fast	3	[1] a. m.	
Loyalty Islands	do	165° E.	11	fast	4	[1] a. m.	
Luxemburg	Europe	15° E.	1	fast	6	p. m.	Middle European time.
Macquarie Islands	Antarctic Ocean (160° E.).						No standard time.
Madagascar Island	Indian Ocean	45° E.	3	fast	8	p. m.	
Madeira Island	North Atlantic	15° W.	1	slow	4	p. m.	
Mahon Island	Mediterranean Sea.	0°	0		5	p. m.	
Malay States, Federated	Asia	105° E.	7	fast	12	midnight.	
Maldive Islands	Indian Ocean		4 54	fast	9 54	p. m.	
Malta Island	Mediterranean Sea.	15° E.	1	fast	6	p. m.	
Marianas Islands (Ladrones).	South Pacific	150° E.	10	fast	3	[1] a. m.	
Marquesas Islands	do	150° W.	10	slow	7	a. m.	
Marshall Islands	North Pacific	165° E.	11	fast	4	[1] a. m.	
Martinique Island	West Indies	60° W.	4	slow	1	p. m.	
Mauritania	Africa	15° W.	1	slow	4	p. m.	
Mauritius Island	Indian Ocean	60° E.	4	fast	9	p. m.	
Mexico (except lower California north of 28°).	North America	90° W.	6	slow	11	a. m.	
Lower California (north of 28° N.).		120° W.	8	slow	9	a. m.	
Miquelon Island	Gulf of St. Lawrence.	60° W.	4	slow	1	p. m.	Atlantic standard time.
Monaco	Europe	0°	0		5	p. m.	Western European time.
Mono Island	East Indies (155° E.).						No standard time.
Morocco	Africa	0°	0		5	p. m.	

[1] The time noted is in the morning of the following day.

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*—Continued

Country	General location	Standard meridian	Time compared with Greenwich	Noon at Washington, D. C. (eastern standard time)	Remarks
			h m s	h m s	
Mozambique	Africa	30° E.	2 fast	7 p. m.	
Nauru Island	South Pacific	165° E.	11 fast	4 [1] a. m.	
Nepal	India	82°30′ E.	5 30 fast	10 30 p. m.	Indian standard time.
Netherlands	Europe		0 19 32.1 fast	5 19 32.1 p. m.	Amsterdam time.
New Britain Island	East Indies	150° E.	10 fast	3 [1] a. m.	
New Caledonia Island	South Pacific	165° E.	11 fast	4 [1] a. m.	
New Guinea Island	East Indies				
Western part (Dutch)		135° E.	9 fast	2 [1] a.m.	New Guinea time.
Eastern part (British)		150° E.	10 fast	3 [1] a. m.	
New Hebrides Islands	South Pacific	165° E.	11 fast	4 [1] a. m.	
New Ireland	East Indies	150° E.	10 fast	3 [1] a. m.	
New Siberia Island	Arctic Ocean	150° E.	10 fast	3 [1] a. m.	
New Zealand	South Pacific	172° 30′ E.	11 30 fast	4 30 [1] a. m.	
Nicaragua	Central America		5 45 10 slow	11 14 50 a. m.	Managua time.
Nicobar Islands	Indian Ocean	97°30′ E.	6 30 fast	11 30 p. m.	
Nigeria	Africa	15° E.	1 fast	6 p. m.	
Niger Territory	do				
Western		0°	0	5 p. m.	
Eastern		15° E.	1 fast	6 p. m.	
Norfolk Island	South Pacific		11 12 fast	4 12 [1] a. m.	
Norway	Europe	15° E.	1 fast	6 p. m.	Middle European time.
Nova Zembla Island	Arctic Ocean	60° E.	4 fast	9 p. m.	
Nunivak Island	Bering Sea	165° W.	11 slow	6 a. m.	
Nyasaland	Africa	30° E.	2 fast	7 p. m.	
Ocean Island	South Pacific	165° E.	11 fast	4 [1] a. m.	
Oceania, French	do	150° W.	10 slow	7 a. m.	
Ogasawara Island	Japan	135° E.	9 fast	2 [1] a. m.	
Orkney Islands	British Isles	0°	0	5 p. m.	
Palau Islands	East Indies	135° E.	9 fast	2 [1] a. m.	
Palestine	Asia	30° E.	2 fast	7 p. m.	
Palma Island	Mediterranean Sea.	0°	0	5 p. m.	
Panama	Central America	75° W.	5 slow	12 noon.	
Canal Zone		75° W.	5 slow	12 noon.	Eastern standard time.
Paraguay	South America		3 37 12 slow	1 22 48 p. m.	Ascuncion time.
Persia	Asia (55° E.)				No standard time.
Peru	South America	75° W.	5 slow	12 noon.	
Pescadores Islands	East Indies	120° E.	8 fast	1 [1] a. m.	
Philippine Islands	China Sea	120° E.	8 fast	1 [1] a. m.	Philippine standard time.
Poland	Europe	15° E.	1 fast	6 p. m.	Middle European time.
Portugal	do	0°	0	5 p. m.	Western European time.
Pribilof Islands	Bering Sea	165° W.	11 slow	6 a. m.	
Principe Island	South Atlantic	0°	0	5 p. m.	
Puerto Rico	West Indies	60° W.	4 slow	1 p. m.	Puerto Rican standard time.
Queen Charlotte Islands	Gulf of Alaska	120° W.	8 slow	9 a. m.	
Raratonga Island	South Pacific		10 38 slow	6 22 a. m.	
Reunion Island	Indian Ocean	60° E.	4 fast	9 p. m.	
Rhodes Island	Mediterranean Sea.	30° E.	2 fast	7 p. m.	Eastern European time.
Rhodesia	Africa	30° E.	2 fast	7 p. m.	
Rio de Oro	do	15° W.	1 slow	4 p. m.	
Rio Muni	do	0°	0	5 p. m.	

[1] The time noted is in the morning of the following day.

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*—Continued

Country	General location	Standard meridian	Time compared with Greenwich	Noon at Washington, D. C. (eastern standard time)	Remarks
			h m s	h m s	
Rumania	Europe	30° E.	2 fast	7 p. m.	Eastern European time.
Sakhalin Island	Sea of Japan	135° E.	9 fast	2 [1] a. m.	Japanese standard time.
Samoa Islands	South Pacific				
Eastern (American)		165° W.	11 slow	6 a. m.	Samoan standard time.
Western (British)		172°30′ W.	11 30 slow	5 30 a. m.	
Sandalwood Island	East Indies	120° E.	8 fast	1 [1] a. m.	
Sandwich Islands	South Atlantic (25° W.).				No standard time.
Santa Cruz Islands	South Pacific	165° E.	11 fast	4 [1] a. m.	
Sardinia Island	Mediterranean Sea.	15° E.	1 fast	6 p. m.	Middle European time.
Savage Island (Niue)	South Pacific		11 20 slow	5 40 a. m.	
Schouten Islands	East Indies	135° E.	9 fast	2 [1] a. m.	New Guinea time.
Scotland	British Isles	0°	0	5 p. m.	Western European time.
Senegal	Africa	15° W.	1 slow	4 p. m.	
Seychelles Islands	Indian Ocean	60° E.	4 fast	9 p. m.	
Shetland Islands	British Isles	0°	0	5 p. m.	Western European time.
Siam	Asia	105° E.	7 fast	12 midnight.	
Sicily Island	Mediterranean Sea.	15° E.	1 fast	6 p. m.	Middle European time.
Sierra Leone	Africa	15° W.	1 slow	4 p. m.	
Society Islands	South Pacific	150° W.	10 slow	7 a. m.	
Sokotra Island	Arabian Sea	45° E.	3 fast	8 p. m.	
Solomon Islands	South Pacific. (160° E.).				No standard time.
Somaliland	Africa				
British			2 59 54 fast	7 59 54 p. m.	Aden time.
French coast		45° E.	3 fast	8 p. m.	
Italian		45° E.	3 fast	8 p. m.	
South Georgia Islands	South Atlantic		2 07 slow	2 53 p. m.	
South Orkney Islands	South Atlantic (45° W.)				No standard time.
South Shetland Islands	South Atlantic (60° W.)				Do.
Southwest Africa	Africa	30° E.	2 fast	7 p. m.	
Soviet Union (U. S. S. R.)	Europe and Asia				
Central Black Soil Area (western).					
Crimean S. S. R.					
Ivanovo Industrial Area (western).					
Karelian S. S. R.					
Kola Peninsula					
Leningrad Area		30° E.	2 fast	7 p. m.	Eastern European time.
Moldavian S. S. R.					
Moscow Industrial Area.					
Northern Area (western).					
Ukrainian S. S. R.					
Western Area					
White Russian S. S. R.					
Abkhasian S. S. R.					
Adzharsk S. S. R.					
Armenian S. S. R.					
Azerbaidjan S. S. R.					
Bashkirian S. S. R. (western).		45° E.	3 fast	8 p. m.	
Central Black Soil Area (eastern).					
Chuvash S. S. R.					
Daghestan S. S. R.					
Georgian S. S. R.					
German Volga S. S. R.					

[1] The time noted is in the morning of the following day.

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*—Continued

Country	General location	Standard meridian	Time compared with Greenwich	Noon at Washington, D. C. (eastern standard time)	Remarks
Soviet Union (U. S. S. R.)—Continued.			h m s	h m s	
Ivanovo Industrial Area (eastern).					
Kalmyk Area					
Kazak S. S. R. (western).					
Lower Volga Area					
Mari Area					
Middle Volga Area					
Nakhichevan S. S. R.		45° E.	3 fast	8 p. m.	
Nizhni-Novgorod Area					
North Caucasian Area					
Northern Area (central)					
Tatar S. S. R.					
Tvanovo Industrial Area (eastern).					
Ural Area (western)					
Votiak Area					
Zyryan Area (western).					
Badakhshansk Area					
Bashkir S. S. R. (eastern).					
Kara Kalpak Area					
Kazak S. S. R. (central).					
Middle Volga Area (southeastern).					
Northern Area (northeastern).		60° E.	4 fast	9 p. m.	
Tadzhik S. S. R.					
Turkmen S. S. R.					
Ural Area (central)					
Uzbek S. S. R.					
Zyryan Area (eastern).					
Kazak S. S. R. (eastern).					
Kirghiz S. S. R.					
Siberian Area (western).		75° E	5 fast	10 p.m.	
Ural Area (eastern)					
Yamal Peninsula					
Oyrat Area					
Siberian Area (central)		90° E.	6 fast	11 p. m.	
Mongolo-Buryat S. S. R.					
Siberian Area (eastern)		105° E.	7 fast	12 midnight.	
Yakutsk S. S. R. (western).					
Far Eastern Area (western)					
Siberian Area (southeastern).		120° E.	8 fast	1 [1] a.m.	
Yakutsk S. S. R. (west central).					
Far Eastern Area (west central).					•
Sakhalin Island		135° E.	9 fast	2 [1] a. m.	
Yakutsk S. S. R. (central).					
Far Eastern Area (central).					
Yakutsk S. S. R. (east central).		150° E.	10 fast	3 [1] a. m.	
Far Eastern Area (east central).					
Kamchatka		165° E.	11 fast	4 [1] a. m.	
Yakutsk S. S. R. (eastern).					
Far Eastern Area (eastern).		180° E.	12 fast	5 [1] a. m.	
Spain	Europe	0°	0	5 p.m.	Western European time.
Spitzbergen	Arctic Ocean (12° E.).				No standard time.
Staten Island	South Atlantic	60° W.	4 slow	1 p. m.	
St. Croix Island	West Indies	60° W.	4 slow	1 p. m.	
St. Helena Island	South Atlantic		0 23 slow	4 37 p. m.	
St. Lawrence Island	Bering Sea	165° W.	11 slow	6 a. m.	
St. Lucia Island	West Indies	60° W.	4 slow	1 p. m.	
St. Matthew Island	Bering Sea	165° W.	11 slow	6 a. m.	

[1] The time noted is in the morning of the following day.

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*—Continued

Country	General location	Standard meridian	Time compared with Greenwich	Noon at Washington, D. C. (eastern standard time)	Remarks
			h m s	h m s	
St. Miguel Island	North Atlantic	30° W.	2	slow	3	p. m.	
St. Pierre Island	Gulf of St. Lawrence.	60° W.	4	slow	1	p. m.	
St. Thomas Island (Sao Thomé).	South Atlantic	0°	0		5	p. m.	
St. Thomas Island	West Indies	60° W.	4	slow	1	p. m.	
St. Vincent Island	do	60° W.	4	slow	1	p. m.	
Straits Settlements	Asia (105° E.)		7 20	fast	12 20	[1] a. m.	
Sudan	Africa						
Anglo-Egyptian		30° E.	2	fast	7	p. m.	
French							
Eastern		0°	0		5	p. m.	
Western		15° W	1	slow	4	p. m.	
Sumatra	East Indies						
Northern		97°30′ E.	6 30	fast	11 30	p. m.	North Sumatra time.
Southern		105° E.	7	fast	12	midnight.	South Sumatra time.
Sumbawa Island	East Indies	120° E.	8	fast	1	[1] a. m.	
Sweden	Europe	15° E.	1	fast	6	p. m.	Middle European time.
Switzerland	do	15° E.	1	fast	6	p. m.	Do.
Syria	Asia	30° E.	2	fast	7	p. m.	
Tanganyika	Africa	45° E.	3	fast	8	p. m.	
Tanimbar Islands	East Indies	135° E.	9	fast	2	[1] a. m.	
Tasmania	Australia	150° E.	10	fast	3	[1] a. m.	
Thaddaeus Island	Arctic Ocean	150° E.	10	fast	3	[1] a. m.	
Timor Island	East Indies	120° E.	8	fast	1	[1] a. m.	Celebes time.
Timor Laut Island	do	135° E.	9	fast	2	[1] a. m.	
Tobago Island	West Indies	60° W.	4	slow	1	p. m.	
Togoland	Africa	0°	0		5	p. m.	
Tonga (Friendly) Islands	South Pacific (175° W.).		12 20	fast	5 20	[1] a. m.	
Trinidad, British	West Indies	60° W.	4	slow	1	p. m.	
Tripolitania	Africa	15° E.	1	fast	6	p. m.	
Tuamotu (Low) Archipelago.	South Pacific	150° W.	10	slow	7	a. m.	
Tunisia	Africa	15° E.	1	fast	6	p. m.	
Turkey	Europe and Asia	30° E.	2	fast	7	p. m.	Eastern European time.
Turks Island	West Indies	75° W.	5	slow	12	noon.	
Ubangi Shari	Africa	15° E.	1	fast	6	p. m.	
Uganda	do	37°30′ E.	2 30	fast	7 30	p. m.	
Union of South Africa	do						
Cape Colony							
Natal							
Orange Free State		30° E.	2	fast	7	p. m.	
Transvaal							
United States of America.	North America						
Eastern		75° W.	5	slow	12	noon.	Eastern standard time.
Central		90° W.	6	slow	11	a. m.	Central standard time.
Mountain		105° W.	7	slow	10	a. m.	Mountain standard time.
Pacific		120° W.	8	slow	9	a. m.	Pacific standard time.
Uruguay	South America	52°30′ W.	3 30	slow	1 30	p. m.	
Venezuela	do	67°30′ W.	4 30	slow	12 30	p. m.	
Virgin Islands	West Indies	60° W.	4	slow	1	p. m.	
Volcano Islands	Sea of Japan	135° E.	9	fast	2	[1] a. m.	
Wales	British Isles	0°	0		5	p. m.	Western European time.
Wrangell Island	Arctic Ocean	180° E.	12	fast	5	[1] a. m.	

[1] The time noted is in the morning of the following day.

TABLE 4.—*Time compared with Greenwich mean time and Washington, D. C., noon*—Continued

Country	General location	Standard meridian	Time compared with Greenwich	Noon at Washington, D. C. (eastern standard time)	Remarks
			h m s	h m s	
Yap Island	Sea of Japan	135° E.	9 fast	2 [1] a. m.	Japanese standard time.
Yugoslavia	Europe	15° E.	1 fast	6 p. m.	Middle European time.
Zanzibar Island	Indian Ocean	45° E.	3 fast	8 p. m.	

[1] The time noted is in the morning of the following day.

V. SUMMER OR DAYLIGHT SAVING TIME

The use of summer or daylight saving time developed largely during the World War. The plan was to advance the time in a certain area by a definite amount during the summer months to permit greater use of daylight hours.

In the United States, Congress in the Act for Saving Daylight passed in March 1918, advanced the time for all sections of the country 1 hour from the last Sunday in April to the last Sunday in September, the change being made at 2 a. m. when it would cause the least disturbance in schedules. This act was reenacted in October 1919 omitting the daylight saving clause, but some States and communities still use daylight saving time by local legislation. The use is by no means general and is entirely a matter of local legislation, having no effect on standard time or time zone boundaries.

Canada took similar action by the adoption of the Daylight Saving Act of 1918. This act lapsed after that year, but, as in the United States, certain sections still continue to use daylight saving time by local legislation.

In Europe "summer time" was used by many countries, but the method and time of application varied greatly. Some countries have retained the summer time laws and still use advanced time for certain periods of the year.

Table 5 gives the countries using summer time and the period of the year in which it is applied.

TABLE 5.—*Countries using "summer time"* [1]

Country	Period when used	Advance made
Great Britain Ireland Channel Island Belgium Luxemburg	Apr. 14, 2 a. m. to Oct. 6, 2 a. m.	1 hour.
France Corsica Monaco	Last Saturday in March to first Saturday in October	1 hour.
Portugal	Fixed annually	
Netherlands	April to October by Royal Decree	1 hour.
Gold Coast	September 1 to December 31	20 minutes.
U. S. S. R.	The time for all zones in the Union was advanced 1 hour from June 20 to Sept. 30, 1930, only.	

[1] This table was compiled largely from notes in the 1935 Report of the Nautical Almanac Office, Royal Naval College, England.

TABLE 5.—*Countries using "summer time"*—Continued

Country	Period when used	Advance made
Sarawak	September 14 (midnight) to December 14 (midnight)	20 minutes.
New Zealand	Second Sunday in October to third Sunday in March	30 minutes.
Canada	By local legislation only	
United States	do	
British Honduras	October 1 to February 14 (approximately)	30 minutes.
Chile	September 1 to March 31	1 hour.
Argentina	Fixed annually	
Falkland Islands	Last week end in September to next to last week end in March	1 hour.
Newfoundland	First Sunday in May (10 p. m.) to first Sunday in October (11 p. m.).	1 hour.

VI. SELECTED REFERENCES

The following list is intended to give the reader sources of general and specific information on standard time. The indexes of the publications named give specific references to the subject.

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