TVA Controversy Center

## Three Kinds Of Time In Use: "Clock-Time" Not Accurate

Time Is An Important Factor of arc, or longitude and latitude. In Navigation. Three Types Used

A thorough understanding of the subject of time is absolutely necessary to the navigator, for time enters into almost every

problem of position finding, both at sea and in the air. There are three kinds

True Solar Time, also year. called Apparent Solar Mean Solar Time. Time, and Sidereal

Time. Apparent Time is that shown by the sun. Our clocks keep Mean or Civil Time. The earth revolves on its axis once in 24 hours, and in theory the sun crosses the meridian of any given place at exactly 12 o'clock by clock time each day. but this theory is not correct, because the earth does not revolve at a uniform rate of speed in relation to the sun. As a result during a part of the year Solar Time is fast of clock time, and oned from the Prime Meridian of part of the time it is slow. As it was Greenwich. As the first 15 degrees impossible to construct a clock to re- multiple to cross the United States cord the complicated variations in the is that of the 75th meridian, our Naval earth's movement in relation to the Observatory was established close to sun it was necessary to devise a sys- this line, actually in 77° 03' 56.7" tem that would be uniform through- west from this meridian measured in out the years to which a clock could be time. Their observations are corregulated. So the astronomers cal- rected to the 75th meridian. These culated the average of all the varia- time belts are given different names, tions during the year, and called it as Eastern, Central, etc., standard Mean Solar, or Civil Time. This is time, and the time is kept uniform in the time kept by our watches, clocks the section about 71/2" on each side and chronometers. It is the time of the meridians of say 75°, 90°, 105°, sent out from the Naval Observatory etc. This is our clock time. at Arlington, computed from Sidereal

for the time thus obtained is the True mtridian. The 180th meridian is known or Apparent Solar Time, the time of as the International Date Line, beo'clock, noon. In order to reduce this days of the date of crossing are used, day and fractions thereof certain cor- earth a ship sailing westward travels rections called Equation of Time. with the sun and its day is lengthened. This can be applied to either of the In sailing eastward the sun advances This conversion is necessary to bring and the ship's day is shortened. This it of use in navigation on the earth's and spaces into spaces and locations

Our clocks do not even keep any of the above mentioned times, only being regulated to Mean Time as shown by the Prime Meridian of Greenwich, or the zero meridian of Longitude, and verified for this country for the 75th meridian, or 5 hours slow of Greenwich Time. So very close ore the calculations of the several observatories throughout the world that they all agree on time down to a very few thousandths of a second, with Arlington the closest of them all to absoof time in general use, lutely correct time throughout each

It became necessary to establish some general time divisions, as it was impossible to operate railroads and even our daily lives, on times different for every place east and west of each other. For example, even as close as Asheville is to us, Waynesville time is almost two minutes slower than is the Mean Solar Time of our neighbor. Therefore, the earth's surface was divided into belts of longitude approximately one hour in time, or 15 degrees of longitude wide, reck-

These Standard Time divisions are reckoned slower than Greenwich, west-Mean Solar Time can not be de- ward to the 180th meridian, and fast termined by observation of the sun, of Greenwich eastward to the 180th the passage of the True Sun across cause in crossing this line a ship eiththe meridian of the observer at 12 er gains or loses a day. Either two Apparent Time to Civil Time the or the date is rejected entirely. This Nautical Almanac publishes for each is because in circumnavigating the times to convert them to the other. to meet the ship and passes on astern, the observed sun time to the time gain or loss is at the rate of one hour shown by our clocks, so as to make for each 15° of longitude made good. Should this correction not be made at surface, by converting time locations the 180th meridian a ship sailing around the world from and to Greenwich, or other port, would find that her date was one day ahead of the local date if she had traveled to the eastward, and one day behind if traveling to the westward. But the navigator must continue to select all data from the Nautical Almanac for the Greenwich date and not for the ship's

In the days of slow ship speeds it was customary to set the ship's clocks each day. But now ships traveling east and west set their clocks to each 15° time belt as they are entered just as we change our clocks and watches for Eastern to Central Standard Time,



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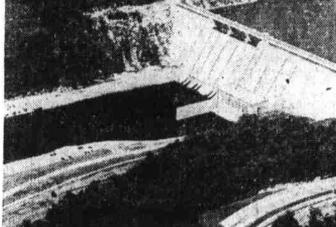
CENTS

PER MILE



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Here is an excellent new aerial view of Norris dam near Knoxville, Tenn., center of the controversy raging over administration of the federal power and flood control project. Largest of the 11 TVA projects, the Norris dam is costing \$36,000,000, has a maximum height of 265 feet, is 210 feet thick at the base, extends for a distance of 1.860 feet, and has a power house with a present generating capacity of 100,000 kilowatts.

Aerial view of Norris dam

word sidus, and means belonging to or keeper are done away with. It is of the stars. Sidereal Time is the measured by the apparent yearly 'Daddy" of all time and it is from the revolution of the stars resulting from observations of the passages of stars the rotation of the earth, this rotation across the meridian that observatories being so regular that the passage of secure their correct time. By the the stars across the meridian occurs

use of the stars the conditions which Sidereal is derived from the Latin render the sun inaccurate as a time

faces are divided to 24 in pasts. This time is converted into that they may be used for latter and longitude above the latter and longitude above. Mean Solar Time for broadcasting to and longitude observations Mean Solar Time for broaded for our This is a very sketchy outline of clocks. Ships reckon their time in very complicated astronomical daily periods of 24 hours, as it sim- ject, but it may be enough to plifies the keeping of navigational vince the landsman that the plifies the keeping of the data. This means that twenty min-data. This means that twenty min-utes after one o'clock p. m. is 13:20 than is told to him by the hands hours, four o'clock p. m. is 16 hours, the pilot clock. While navigation, while 11 p. m. is 23 hours. The Civil in its solutions as it is by table

real Time as a point of reference. no room for errors on the past of a Its prime meridian passes through the navigator. What, he should know he point of intersection of the celestial MUST know if he is to get a equator and the ecliptic—the vernal where, and is to keep his ship to equinox, or First Point of Aries leaving her bones on the rocks. To Sidereal Time can be found from the is one of the prime subjects for passage of any star ever the merid- thorough understanding. He ian of the observer, if the star's right be able to juggle it from one form ascension, or distance, from the First another through all of its intro Point of Aries is known, just as a relationships to every form of ship's position can be located on a tronomical observation for position chart if its distance from the "First finding. Point" of Greenwich is known. The Nautical Almanac gives the right

with great precision. Observatory stars, and for the planets, for the clocks show Sidereal Time and their day in the year. The position faces are divided to 24 in place of 12 many more stars are also given

Day starts at midnight, as does our the Nautical Almanac, is not a day, but is not divided into a. m. and difficult subject to master for all a tical purposes, it is a subject of a No particular star is used in Side- most precision, and there is absol

The world's worst weather is cha ascension, declination, Greenwich hour angle and time of transit at Greenwich for some fifty or more blizzard.

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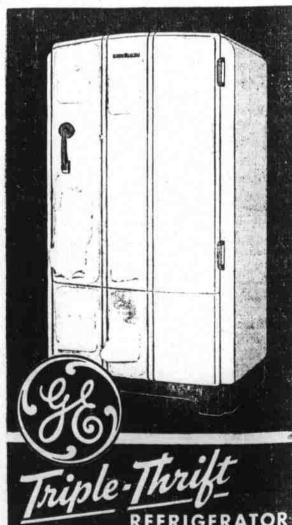
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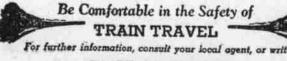
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