



it in the evening. Then, even when they realized it was one, they still thought it revolved around the earth, like the sun and the other planets. The complicated Ptolemaic system was erected to explain these movements, and even then it did not do so with entire satisfaction.

Now we know, of course, that Venus, the earth, and all the other planets, revolve around the sun. Venus' path is the one next inside ours. It goes around more rapidly, in 225 instead of 365 days. Nearly a year ago, Venus was in line with the sun, and hence invisible. But unlike its position now it was then on the far side of the sun. The earth and Venus move in the same direction, so Venus gradually caught up to the earth, and on June 26 it will pass us. Being so much closer, it goes by very rapidly, like an automobile a few feet away, compared with one a block away. Even though each one may be going directly across our line of sight and traveling at the same speed, the nearer one seems to move much more rapidly.

Through a telescope this month Venus appears as a narrow crescent, like the very new moon. A year ago it looked more like a full moon. This change, incidentally, provided a very good proof that something was wrong with the Ptolemaic theory. Under that system, Venus was moved around the earth in a path nearer to us than the sun. Hence, it could show a crescent phase, but could not possibly ever appear full. So, when Galileo found in 1610 that it duplicated the complete cycle of the moon's change of phase, he proved that Venus was sometimes nearer, and sometimes farther than the sun. He inserted firmly a very large nail into the coffin of the old Ptolemaic idea.

**Celestial Time Table for June**

Sunday, June 2, 1:12 p. m., Moon passes Jupiter. Monday, June 3, 12:12 a.m., Moon passes Saturn. Wednesday, June 5, 8:05 p.m., New moon. Friday, June 7, 1:00 a.m.,

Venus passes Mars; 7:58 a.m., Moon passes Mercury; 11:37 p.m., Moon passes Venus. Saturday, June 8, 1:00 a.m., Moon passes Mars. Tuesday, June 11, 9:00 p.m., Mercury passes Venus. Wednesday, June 12, 8:59 p.m., Moon in first quarter. Friday, June 14, 10:00 a.m., Moon nearest—229,400 miles away. Sunday, June 16, 8:00 p.m., Mercury passes Mars. Wednesday, June 19, 6:02 p.m., Full moon. Friday, June 21, 8:37 a.m., Summer commences—sun farthest north. Monday, June 24, 9:00 a.m., Mercury farthest east of sun—visible as evening star for few days around this date. Wednesday, June 26, 4:00 p.m., Venus passes earth—between earth and sun. Thursday, June 27, 6:00 a.m., Moon farthest—251,100 miles away; 1:13 p.m., Moon in last quarter. Sunday, June 30, 7:46 a.m., Moon passes Jupiter; 1:47 p.m., Moon passes Saturn.

Eastern Standard Time throughout.

Science News Letter, June 1, 1940

ENGINEERING

**New Type of Vacuum Tube Has Unusually Long Life**

A NEW TYPE of vacuum tube for amplifying and repeating weak electrical messages that carry long-distance telephone communication has been developed by scientists of the Bell Telephone Laboratories. It is confidently expected to give many years of continuous 24-hour-a-day service.

The present telephone tube, which the new advance replaces, has a theoretical average lifetime of 18,000 hours. The new tube will exceed this several times, scientists report.

Best comparison of the new and the old is that after 22,000 hours of service (two and a half years) only 55% of the old style tubes were in service. With the new tubes 95% were in service after the same interval of time. From comparison of the "death" curves of the two vacuum tubes telephone engineers estimate, conservatively, an average lifetime several times longer for the new tubes than for the old.

For the layman, whose nearest contact

with vacuum tubes is probably in his radio set, this new advance will probably be a worry for he knows that his radio tubes are guaranteed only for a life of 1,000 hours of operation. The worry will be the same type of difficulty which arose last year when Dr. F. B. Jewett, vice-president of the American Telephone and Telegraph Company, was vigorously questioned at the Monopoly Committee hearings in Washington about other telephone repeater tubes having a life of 50,000 hours.

It was disclosed then that the principles which give long life to telephone tubes can be applied to the tubes used in radio sets, but that high cost would probably rule them out. Moreover, excessive long life of such tubes, which is the key demand on telephone circuits, would permit them to outlast the rest of a common radio set many times. It would be like putting jewel bearings in a dollar alarm clock.

The extra long life of telephone repeater tubes comes about because of the extreme care in their production, plus a most rigid test, prior to use, which eliminates many tubes which might quickly show failure in service.

Science News Letter, June 1, 1940

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**IDEAS WANTED**

Instrument Manufacturer contacting photographic, aeronautical and automotive trades—wants new ideas, inventions and designs for products in the optical and electrical fields. Items having possibilities of large volume production and wide sales promotion will be considered on royalty basis or outright purchase.

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