

M.W.Burke-Gaffney

Retail Lumber Dealers' Association  
Nova Scotian Hotel  
April 1, 1966 \*

### EXPLORATION OF THE MOON AND PLANETS

Before the year 1961, the American Space Program was hampered by frequent changes in plans . President Kennedy stepped in. He laid down that the Moon program was to have top priority. He asked that a firm program be drawn up for getting to the Moon by the year 1970, and that the program be adhered to.

Since then, there have often been urges to change plans. <sup>In</sup> Most <sup>Feb 1966</sup> recently, NASA gave hearing to a strong appeal to imitate the Russians, by landing on dry land instead of in the sea. The appeal was rejected. It would entail re-designing the Apollo Spacecraft. It would definitely delay the program.

The Apollo program, as drawn up in 1961, planned both manned and unmanned flights. The manned flights were: Mercury, Gemini, and preliminary flights in the Apollo spacecraft.

The Mercury flights have been successfully completed. The Gemini flights are in progress. They have already determined man's ability to stay in orbit for two weeks. They are now training men to work and to maneuver in space.

The unmanned flights planned in 1961 were: Ranger and Surveyor. The Ranger program was completed with the close-up pictures of the Moon. The first Surveyor capsule is due to be soft-landed on the Moon within a few months. The Russians knew that the American program called for a soft landing this year. This knowledge stimulated the Russian effort, begun last May, to make a soft landing on the Moon. They

*\* changed ~~the~~ its name (at the two-day convention March 31-April 1966, "Retail Building Materials Dealers Assoc.")*

~~Stimulated the Russian effort, begun last May, to make a soft landing on the moon. They~~ tried, and failed, four times last year, - in May, June, October and December. They succeeded this year, on February 3rd, with Luna 9. *They now have Luna 10 on the way.*

Sir Bernard Lovell, at Jodrell Bank, in England, had tracked Luna 9 all the way to the Moon. Four minutes after its landing, he started receiving new signals from it. Sir Bernard recognised the signals. They were of the type that could be converted into pictures. He hoped, on the morrow, to do just that.

Meanwhile, in Moscow, the regular radio program was interrupted to announce that Luna 9 had landed on the Moon, in the Ocean of Storms, and that *had been* "a communication link ~~was~~ established with Earth".

When Luna 9 landed on the Moon, the Moon was two days before its Full phase. It showed to us a thin dark crescent to the left. Luna 9 landed on the dark portion of the Moon. Its camera received a command from Russia to start operating. It obeyed. Lovell received its signals.

So did the Russians. But no pictures came that evening, *because* the camera was in the dark. *It was for this reason that* The Russians announced that a communication link had been established.

*(merely)*  
*They were keeping their fingers crossed.*

On the Moon, the interval from sunrise to sunset is about 14 days. The day after Luna 9 landed, it was in sunlight, with the sun 7 degrees above the camera's horizon, when it next received a command to operate.

Apr 1

February 4th was a big day at Jofrell Bank. Fortunately, the Moon was not rising until the afternoon. There was time to prepare a good reception for it.

The Daily Express, of London, lent a radio-photo receiver to Sir Bernard Lovell. This was connected with the radio telescope. About 3.30 in the afternoon, pictures started coming in. That evening, two of the pictures were shown on **British TV**. ~~Most good Muscovites were in bed when the British were looking at the pictures from Luna 9, xx~~ Moscow time is three hours ahead of Greenwich time.,- so most good Muscovites were in bed when the British were looking at the pictures from Luna 9. They had gone to bed happy with the news, fed to them by the Moscow radio, that Russia had obtained pictures from Luna 9, which would "be released in good time".

The following morning the Russians were not happy when they learned that the British had scooped them on the pictures. That afternoon, and the following afternoon both the British and Russians received more pictures. On Sunday, the batteries of Luna 9 died. The Americans were surprised that the batteries lasted only three days. When they land instruments on the moon, they hope to have them function for *at least* six weeks after landing. *It may be that Luna 10, next Monday, hopes to improve on Luna 9's performance.*

It was on Thursday, February 3rd, that Luna 9 landed on the Moon. On Monday, February 7th, in the United States, the magazines Time and Life went to press. Both were loud in their praise of Russia's landing a one-and-a-half ton craft on the Moon.

That night, after the Russians had, for four days, received ~~praise from~~ all over the world for their feat, and after being reasonably sure that weeklies all over the world would carry the story that they

had landed a one-and-a-half spacecraft on the Moon, they blandly announced that the one-and-a-half ton space craft had not soft-landed. About one second before it crashed, it had ejected an instrument package, weighing 220 pounds, which soft-landed.

There is a big difference between soft-landing a ton-and-a-half spaceship and a 220 pound capsule. A capsule that would weigh 220 pounds here on Earth would weigh less than 40 pounds on the Moon.

The Russians <sup>claimed to have</sup> never ~~soft-landed~~ soft-landed a ton-and-a-half on the Moon. Their statements were carefully worded. For instance, they had <sup>announced</sup> ~~claimed~~ that the landing showed that the surface layer of the Moon is "strong enough to support more or less heavy objects". This seemed a very modest statement, until we learned that the object was in fact only more or less heavy.

Between the first day <sup>that</sup> photos were received and the next day, the instrument package <sup>on the moon</sup> settled a little. A comparison of two photos, of the same area, one taken on Friday, and the other on Saturday, show that in the interval, the camera had become tilted. The surface on which the capsule lay cannot have been too hard, if <sup>the equivalent of 40 pounds</sup> a ~~220 pound~~ package sank further into it, at one corner, about 48 hours after coming to rest on it.

After announcing that what was soft-landed was an instrument package, the Russians said that the lens of the camera on the moon was about knee-high, or about two feet off the lunar ground. This disclosure made the early British and American interpretations of the photographs sound silly. They were based on the supposition that the photos were

taken from a height of about ten feet, - a supposition which put the horizon twice as far away as it was, and increased correspondently estimations of the heights of objects.

A foreground object which threw a long shadow was <sup>well</sup> judged by the Soviets to be about six inches high. Further away, objects about a foot in diameter were common. They looked like stones, but could be piles of cinders. From the photos we can say that the lunar surface <sup>(in the area photographed)</sup> is a rough-textured porous mass with disparate sharp-edged fragments scattered over it.

Photographs cannot tell the hardness of a surface. What we have learned from Luna 9, is that a <sup>package weighing 220 pounds on Earth</sup> ~~220 pound package~~ falling at about 10 miles per hour, sank a few inches on the surface where it landed, and after about 48 hours tilted, as though one corner of it was resting on something which gave way under its weight.

So much for Luna 9. ....

On March 2nd, headlines in the newspapers told us of the Russians having landed a spacecraft on Venus.

Before speaking about this achievement, I wish to remind you of what already had been achieved in interplanetary travel.

On August 26, 1962, the Americans launched their Mariner II to fly by Venus. After a 109-day flight, it flew by Venus on December 14. During its flight it kept sending back information. It made the discovery that as Venus was approached, the solar wind got stronger. In passing by Venus, it found that Venus had little or no magnetic field. Its temperature measurements led to the conclusion that the surface temperature <sup>of the planet</sup> was about 800°F., which is about 200° higher than ~~astronomers on Earth~~ <sup>Mariner II flew by the planet</sup> had estimated. ~~XXXXXXXXXXXXXXXXXXXX~~

at a distance of about ~~22,000~~ 22,000 miles. Due to drifting in the solar wind, it did not pass as close to Venus as ~~originally planned~~<sup>9,000 mi.</sup>. The lesson was learned that in interplanetary flights some allowance must be made for the ~~solar~~ wind or to overcome drifting in it.

In sending back information from the vicinity of Venus, when it was 36 million miles from Earth, the Americans set up what was then a long distance radio communication record.

A new long distance record was set up by the American Mariner IV, when it flew by Mars on July 14, 1965, and sent back information (and photographs) from a distance of 134 million miles. Thereafter, as Mariner IV continued to orbit round the Sun, its radio record was improved <sup>each day</sup> upon <sup>until</sup> October 1st. Then, when it was 191 million miles from the Earth, and its daily messages were pretty much the same, its radio was turned off (by ~~remote control~~<sup>remote control</sup> ~~in order~~<sup>in order</sup>) to conserve the batteries, so as that they would function in September 1967, when Mariner IV will be passing close to the Earth. However, on January 4th last, the radio was turned on again because Mariner IV was computed to be, on that day, at its furthest from the Earth. Mariner IV was contacted and replied, setting up a long distance communication record of 216 million miles.

When passing Mars, Mariner IV sent back a wealth of information. The atmosphere of ~~the~~ Mars is very thin. The atmospheric ~~temperature~~<sup>pressure</sup> at its surface is about 15 millibars, or about the same as the pressure at 18 miles above our Earth. Mars has an ionosphere. It has ~~no magnetic~~ little or no magnetic ~~field~~ field. The strip of its surface photographed is pock-marked with little craters.

1966 Apr 1

Mars is a more difficult target than Venus. It is further away, and is only about half the size of Venus. Mariner IV flew by Mars, ~~as planned,~~ at a distance of about 6,000 miles.

The Russians have not, as yet, succeeded in getting a spacecraft to Mars. It is not for want of trying. They have had six failures.

The success of the Mariner IV flight was in large measure due to the experience gained by Mariner II. To counteract drift from the solar wind there was installed in Mariner IV an electric eye tuned to keep its eye on the star Canopus, the brightest star in the region of the sky towards which the spacecraft was sailing.

The Russians, besides making six unsuccessful attempts to send a space craft to Mars, also made six unsuccessful attempts to send a spacecraft to Venus.

~~besides making six unsuccessful attempts to send a~~  
~~The Russians have not, as yet, succeeded in getting a spacecraft~~  
~~spacecraft to Mars,~~  
~~to Mars. It is not for want of trying. They have had six failures.~~  
~~They also made six unsuccessful attempts to send a spacecraft to Venus.~~

Their space craft, named Venus 2, which ~~flaw by the planet Venus~~ on February 27th, ~~was their seventh attempt.~~ Venus 2 was launched on November 12, 1965. Four days later, Venus 3 was launched. Shortly afterwards, an official Soviet statement announced that the two spacecraft would pass the planet Venus, on opposite sides of it, about March 1st.

On February 10th, at a press conference on the soft landing of Luna 9 on the Moon, Dr. Keldysh, head of the Soviet Academy of Science, said that a soft landing on Venus was not planned, that both would fly by Venus about March 1st. On February 27th, a Reuter's dispatch from Moscow announced that Venus II and Venus III were scheduled to pass Venus during the current week, on either side of the planet.

That the two spacecraft were to pass on opposite sides of the planet was a satisfactory explanation of why the two had been launched within four days of each other. Making almost simultaneous observations from opposite sides of Venus could have scientific value.

The world was surprised on March 1st, when Moscow announced that Venus III had landed on Venus and that Venus II had flown by it on February 27th, the day on which Reuter, in Moscow, was permitted to release a dispatch reminding the world of the pending double fly-by.

Pressed by enquiries on March 1st, a leading Soviet Space Scientist, Professor Ivanchenko, said that the re-iterated statement that there was to be a double fly-by had been made "to justify the entire experiment in



case a mid-course manoeuver of Venus III was not successful in pin-pointing the planetary target". To <sup>the minds of pressmen</sup> ~~pressmen~~ ~~minds~~ jumped the questions: What are we now to believe? Is the story of the landing to justify the failure of a double fly-by? Did Venus III hit the planet by mistake? That this was not so was suggested by the official Soviet announcement <sup>that</sup> the spacecraft had "delivered to the surface of Venus a pennant bearing the coat of arms of the Union of Soviet Republics", and that inside was a medal bearing the Soviet coat of arms.

The Soviets admit that as Venus III was nearing the planet Venus, radio contact with the spacecraft was lost. When contact was lost, the craft was heading for the planet and could not miss hitting it. The computed time of landing was given as 9.56 A.M., Moscow time.

Astronomers round the world estimated that the spacecraft Venus III, when it entered the atmosphere of Venus, must have been travelling at about 11,000 miles per hour relative to the planet. It must have, at the very least, been badly scorched <sup>(if not burnt up)</sup> in passing through the atmosphere of <sup>Venus,</sup> ~~the planet,~~ which is one unbroken hollow sphere of carbon dioxide. On hitting the planet's surface it would bury itself, if the surface is soft, or be smashed into smithereens, if the surface is hard.

*after these criticisms and about*

~~About~~ <sup>After</sup> ten days after the crash of Venus III, the Russians announced that the spacecraft was meant to eject a 35-inch diameter sphere, covered with heat protective material, which was to land by means of "a parachute system". What did happen, the Soviets do not know. Together with this frank admission, the Russians disclosed that they had also lost contact with the spacecraft Venus II, before it flew by Venus, at a distance of 25,000 miles from the planet, <sup>3,000 miles further</sup> from the planet Venus than Mariner II was, when it flew by, <sup>in</sup> 1962.

Russian Venus

The net result is that neither spacecraft sent back any information <sup>about</sup> the planet Venus, and that the Russians have not yet succeeded in extending their radio communication beyond ~~something less than~~ 30 million miles, about one-sixth of the distance over which the Americans had communication with Mariner 4, on January 4th last.

~~A little over a month ago (February 25), the leading article in the weekly journal Science was~~ A comparison of the efforts of the United States and the efforts of the Soviet Union at planetary exploration, <sup>is enlightening</sup> The United States' effort remains minimal, despite success. The Soviet effort remains large, despite failure. Russia has devoted 25 per cent of its space flights to planetary probes. The United States has devoted only 7 per cent.

In the United States, the Moon program has priority. Nothing is done, nor will be done, to interfere with that program. American space flights are primarily a search for knowledge. NASA is dominated by scientists. The Russian program is dictated by the Russian propaganda machine. The Russians like to impress the world by being the first to do this, that, and the other thing. They know that ~~starving people and~~ <sup>millions of people in</sup> ~~underprivileged countries~~ <sup>are more</sup> ~~impressed~~ <sup>impressed</sup> by the Russians hitting Venus with useless hardware, than they are by the announcement of the fact that the pressure at the surface of Mars is 15 millibars.

~~In conclusion, I would like to remind you of the early days of the Second World War. In the year 1940, in the eyes of all but Winston Churchill, the British and French seemed to be destined for defeat. Churchill predicted that the war would last six years, and that to win the war, we must have planes in plenty and men to man them. <sup>He instituted</sup> ~~the Commonwealth Training Plan, which grew until there were three hundred~~~~

About 18 months ago, the American Academy of Science, petitioned the President of the United States to order priority for the exploration of Mars, after the Moon program is finished. No action was taken and no promises were made. As a consequence, plans for the exploration of Mars remain a drawing board exercise. It looks as though after Project Apollo is completed, space ventures may be catch as catch can.

Last Monday (March 28), in Baltimore, there was a joint meeting of the American Institute of Aeronautics and the American Astronautical Society. The theme of the conference was "Stepping Stones to Mars". It was suggested that on the first manned mission to Mars, men should spend at least 21 days there, exploring. Sketches were submitted of prefabricated aluminum shelters to house them. So, if any of you contemplate extending your business to Mars, you had better start stocking aluminum, *and advertise yourselves as "Building Materials Companies" rather than Sumter Dealers.*

In conclusion, I would like to remind you of the early days of the Second World War. In the year 1940, in the eyes of all but Winston Churchill, the British and French situation looked desperate. Churchill predicted that the war would last six years, and that to win the war, we must have planes in plenty and men to man them. He instituted the Commonwealth Training Plan, which grew until there were three hundred thousand airmen

1966 Apr 1

~~years there were three hundred thousand men~~ from Australia, Britain, Canada and New Zealand training in Canada. Meanwhile the British were driven out of Greece and Crete. The Germans were knocking at the door of Alexandria in Egypt. Many (notably the Australians) pleaded that men should be taken from training and sent to help the armies in the field. Churchill said: "No", and was adamant. In May 1941, the pride of the British Navy, the Hood, was sunk near Greenland. In December of that year, the Americans were drawn into the war. They lost the Phillipines. The British lost Malaya, and <sup>also</sup> their second-best battleship, the Prince of Wales. Eisenhower joined Churchill, and was in agreement with Churchill's policy. Let the enemy have their day of petty victories.

So in space. In years to come, the days of the Russian 'firsts' will be forgotten, when the Americans will be the masters of outer space, even as the British were once rulers of the high seas.