# Mirrorscope

# RED PLANET: HOW THEY BROUGHT THE GOOD VIEWS TO EARTH

SIXTY million miles is a tremendously long way to send back close-up pictures of Mars—especially if your Spacecraft is only equipped with a weak radio transmitter with no more power than a faint 20-watt electric light bulb.

Yet, this week, the near miracle has already been performed by the first of NASA's Martian planetary probes, Mariner 6.

As with previous Mars and Lunar survey flights, the pictures are taken with TV cameras scanning the surface just as the cameraman scans the set in a TV studio. And in much the same way the picture is then converted into electrical signals.

But, because the Mariners are hurtling through space at about 16,000 mph, there is no time to send these signals back to earth directly. Instead, they are recorded on magnetic tapes aboard the spacecraft and then replayed once the crucial part of the flight—the "near encounter"—has taken place.

On replay, the information on the magnetic tapes is converted into coded radio signals and transmitted back to earth. It takes a mere five and a half minutes to bridge the sixty-million-mile gulf at the colossal speed at which radio waves travel.

Back on earth, the now very weak radio signals are picked up by NASA's big 210-foot radio dish at Goldstone, California. From here a very-short-wave (microwave) radio link pushes the precious cargo of information through to the scientists waiting at the jet propulsion laboratory in Pasadena.

In the laboratory itself the impulses are fed into a computer which assembles them until it has built up a complete picture. This is finally thrown on to a television screen for detailed examination.

The computer is a highly sophisticated piece of machinery capable of producing an accurate picture so sensitive that it is programmed to distinguish between actual picture elements and atmospherics or distortion.

For the next few weeks it will be used to improve the Mariner pictures already received and those still to come up, eliminating "noise"—small dots of light caused by electronic disturbance and the great distance involved. In fact, when the noise is eliminated, new details will emerge from the Mariner pictures that have already been received.

Each picture reaches the laboratory as a 50 million-mile long wave of dots and dashes, spaced one every 15 miles.

Each picture needs about 5½ minutes of sending time to play back all the coded information. But this is a vast improvement on the earlier Mariner 4 Mars shot of 1964.

The trajectories of the Mariner spacecraft have been so designed that the close-up pictures will cover as wide a variation of Martian features as possible; the permanent dark markings, oases, "blue" maria, canals, polar caps, white markings on crater rims and circular light areas which vary in colour.

**Dr. PETER STUBBS**

# RED PLANET: Can Man overcome the barrier inside his mind?

**by ARTHUR SMITH**

**MAN has brilliantly grasped the Moon, the ping-pong ball in the Space game. Now his robots are reaching towards the bigger ball, Mars.**

**The pictures that the Mariner space craft is pushing back to Earth this week are not going to be the decisive factor in deciding whether Man makes a personal appearance on the red planet.**

**But the success of the current mission, underscoring the feat of Moon conquest, will swell the claims of a weighty report that will hit President Nixon's desk on September 1.**

**The report comes from a committee headed by his Vice-President, Spiro T. Agnew, and will contain the recommendations for America's Space programme for the next ten to fifteen years.**

**Current performance would seem to indicate that Nixon and America's rulers will not be able to resist the challenge of patterning the Martian surface with her astronaut's bootprints.**

**A deluge of scientific know-how will surround such a decision, but as Mankind watches those Mars pictures get bigger and bigger this weekend the question looms equally large: Can Man or superman mentally withstand a two-year round-trip to the planet? Unswayed by the Moon achievements, a large group of people are saying that to enclose men in a small capsule for the length of such a flight could be an intolerable burden.**

**Apologising for his cynicism, a London psychiatrist voices the misgivings like this; "I think it is beyond Man as we know him, and no amount of training can be enough. There must come a limit where only robots can cope.**

**"On the Moon trip the astronauts were kept very busy, and it didn't last long. But to keep men in a small space for a long period, heading for a target he does not know, can give rise to all the infantile and archaic fears.**

**"Even allowing for the fact that the astronauts are so well trained it is quite conceivable that a man could become dominated by his fantasy life, and such fantasies could be passed from one to another."**

**But in the flush of enthusiasm after the brilliant success of Apollo it seems likely that Agnew's committee will at least give a guarded go-ahead for a Mars project.**

**What other problems will such a decision raise? The first one will be the question of cost. Over eight years Apollo has cost about £10,000 millions, and even the most conservative estimates for Man's flight to Mars are in a region two or three times higher than that.**

**But the simple fact is that America can afford to spend this sort of money.**

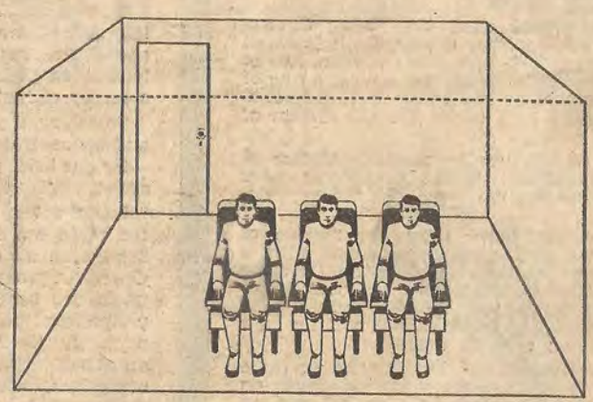
**The next question is the hardware. To get to Mars, to put men on the surface and to bring them back, will involve problems of life support guidance and navigation and communications which will be several times more difficult than the same problems in Apollo. But the basic problem has been solved and an extension of the Apollo technique will probably be good enough.**

**The development of a nuclear upper stage for the Saturn V rocket will be necessary in order to cut down the travel time to Mars to a reasonable number of months. Favourable oppositions—when Mars is closest to the Earth—occur every two years or so, and every 15 years the planet comes as close as 30 million miles.**

**The next such opportunity is in 1971, when two Mariner Spacecraft will be put in orbit round Mars. But the first occasion when a manned flight could be made will be in 1986. That gives the Americans plenty of time to develop a Spacecraft which would be able to support life for up to two years.**

**Although the nuclear upper stage could be used to propel the Spacecraft to Mars in four or five months, the flight might still take almost two years because the astronauts would have to wait, either on the surface of Mars or in orbit around it, for the next favourable opportunity to return to Earth.**

**Could they do this without losing their sanity? Exercise and special equipment probably prevents the sort of muscle wastage and bone degeneration that has been seen on the longer U.S. Spaceflights up to the present, but no one knows how severe the effects of isolation for up to two years will be.**



CLOSE CONFINEMENT: Astronauts bound for Mars would have to live together for six months in a capsule measuring about 22 feet by 16 feet — the size of a suburban sitting room.