

# The Last Voyage of Sir Clowdisley Shovel

Commander W. E. May, R.N.

(National Maritime Museum)

MUCH has been written from time to time about the disaster which befell the fleet under Sir Clowdisley Shovel (or Shovell) among the rocks of the Scilly Islands on 22/23 October 1707. Although many writers have discussed the cause of the catastrophe I have come across no one who has examined the D.R. positions of the various vessels involved, and it is these which I propose to consider here.

It may be as well to recapitulate the story of the disaster. (At this time, it should be noted, the day at sea was measured from noon to noon and began twelve hours earlier than the civil day. Consequently, the afternoon at sea had a later date to that ashore. Noon positions logged were those at the end of the sea date.)

England was at war with France and Sir Clowdisley Shovel had been operating against that country's shipping in the Mediterranean. Although Gibraltar had fallen into our hands in 1702 the Royal Navy still lacked sufficient base facilities to maintain a large fleet in those waters, and, besides, it was considered unwise to keep the largest ships at sea during the winter. In consequence the admiral with about half the fleet<sup>1</sup> left Gibraltar for home on 29 September, picking up the *Panther* off Tangier, and the ships took their departure from Cape Spartel, which bore SE. about five leagues at 8.0 a.m. on the 30th.

Weather on the passage was not good. Gales from the westward blew from 5 October until the 10th when the wind went round to the ENE., dying down next day. The 12th and 13th were squally and were followed by two days of light winds. Then strong easterly gales blew on the 16th and 17th, dying away on the 18th though cloud remained. On the 19th there was a strong north-westerly gale which was renewed on the 21st after a day of north-easterly squalls. All the same, the sky did clear for a little on the 21st so that some ships got observations for latitude. Soundings on this day varied between 90 and 140 fathoms showing that they were on the edge of the continental shelf but otherwise were not of any great help.

At 11.0 a.m. on the 22nd the *Lenox*, *Valeur* and *Phoenix* were detached to Falmouth for convoy duty and steered a more northerly course than the rest of the fleet. (The captain of the *Lenox* gives the time of parting company as 11.0, his two lieutenants as 7.0 and 10.0. The captain of the *Phoenix* says 8.0, the captain of the *Valeur* 11.0 and his lieutenant 10.0.) No sun was visible that day and around 4.0 p.m. the fleet hove-to

for about two hours to obtain soundings; then, satisfied that they were in the mouth of the Channel and clear of all danger the ships ran to the eastward before a favourable gale. Less than two hours later the leading and more northerly ships found themselves among rocks and fired guns, the recognized warning of danger, but to no avail. At about 7.30 or 8.0 p.m. (times logged are usually to the nearest hour or half-hour) the *Association*, *Eagle* and *Romney* struck on either the Bishop and Clerks or the Gilstone Ledges and only two men reached the shore. Of these one was the Admiral who seems to have been immediately murdered by the local ladies for the sake of the ring he wore. Two vessels, the *St. George* and *Firebrand*, also struck but got off. The *Firebrand*, however, was so badly holed that she sank in deep water leaving only twenty-three survivors. Several other ships had narrow escapes but managed to wear clear.

The *Lenox* and her consorts steered NE. by N. until 2.0 p.m. when, the weather being thick and her captain apparently afraid of running ashore on the Cornish coast, they altered course to E.  $\frac{1}{2}$  S. or E. by S. and at 4.0 p.m. to ESE. It was not until 3.0 a.m. that they ran into danger, the *Phoenix* scraping over the rocks of Samson Island to safety and the other ships wearing clear.

Information concerning the navigation of the squadron can be obtained from the log-books of the ships involved. Since lieutenants as well as the captains and masters were required to keep log-books there should be available, among the sixteen ships which escaped destruction, sixteen from captains (or commanders), nine from masters and thirty-six from lieutenants. Of these sixty-one log-books I have been able to trace forty-four, the seventeen which are missing being those of two captains, two masters and thirteen lieutenants. Eight of the latter are accounted for by the disappearance of the complete volumes of lieutenants' log-books of the *Royal Ann* and *Somerset* for this period.

There are four cases of duplication. Lieutenants Thomas Jacobs and Walter Lashbrooke of the *St. George* copied each other as did Lieutenants John Furzer and Streynsham Masters of the *Monmouth* (the former in this case being incomplete), Captain Richard Griffiths and Lieutenant Andrew Horseman of the *Swiftsure*, and Lieutenants Thomas Graves and Arthur Field of the *Torbay*. Still we are left with forty different log-books for study.

The fleet took its departure from Cape Spartel on 30 September and on that day it was natural that no one should take an observation and few should record a noon position in latitude and longitude, though most did in terms of bearing and distance from Cape Spartel. It has often been stated that the weather was bad throughout the voyage and that consequently no sights were possible. This is not correct. On fifteen days of the twenty-two taken for the voyage one officer at least records that he obtained his latitude by observation. Actually only nineteen log-books indicate whether positions are observed or by dead reckoning and of

these two show both. It is quite possible that other officers took sights but did not distinguish the latitudes from them. The most surprising thing is the enormous spread in noon latitudes from observations, the greatest difference between the most northerly and the most southerly figures given for any one day being 41 miles and the average for the eleven days when two or more officers observed being  $25\frac{1}{2}$  miles. It is possible that Lazarus Watts, the master of the *Monmouth*, had a backstaff with a large index error. His observations for the latitude are always low and if we omit them, though the maximum spread remains at 41 miles the average drops to 19. If we turn to D.R. latitudes, the spreads are even greater—a maximum of no less than 141 miles and a daily average of 73 miles. Again one man is responsible for a great deal of this, namely Lieutenant Joseph Hall of the *St. George*, On fourteen of the twenty-two days his position was considerably to the north of that of any other officer, being on one occasion as much as 46 miles further north than anyone else. If we omit his log-book the average daily spread drops to 54 miles. On one day the officers of the *St. George* differed by as much as 111 miles from one another in their estimates of the latitude.

Most officers show their longitude as west from Cape Spartel, it being generally the custom to measure longitude from the last land seen. Lieutenants Thomas Jacobs and Walter Lashbrooke of the *St. George* and Peter Anderson of the *Valeur* and Captain Henry Hobart of the *Panther* give their longitudes from a point in the Atlantic which appears to be Teneriffe. Lieutenant Alexander Geddes of the *Rye* uses a prime meridian about  $7^{\circ} 40'$  east from Spartel, possibly Cape de Gata. Lieutenant Jerome Barker of the *Panther* complicates matters by giving his longitude from Cape Spartel on two occasions but the difference of longitude from the previous noon on all other days. Captain Edward Vernon of the *Rye* always gives difference of longitude from the previous noon. Joseph Lyne, master of the *Somerset*, ignores longitude for the greater part of the voyage and for the last six days gives longitude from Trafalgar. Lieutenant John Ripley of the *Swiftsure* started by taking his departure from Spartel but when she reached her furthest west he forgot to subtract his daily difference of longitude but added it so that at the end he was claiming to be eleven or twelve degrees to the westward of anyone else.

Richard Rymer, master of the *Swiftsure*, was another curious navigator. After recording that he had reached  $9^{\circ} 30'$  west of Spartel on 10 October, his furthest west, he starts recording his longitude as easterly, apparently using  $9^{\circ} 30'$  west of Spartel as his prime meridian. Then on 16 and 18 October he reverts to a westerly longitude, so great that he would seem to be using a prime meridian  $24^{\circ}$  east of Spartel.

Rymer conforms to custom and every day gives the bearing and distance of his point of departure and the course and distance made good since the previous noon. It might be expected that his noon positions could be checked by comparing them with those worked from his bearing and distance or from the daily traverse. Unfortunately these do not check in

any way. Many errors are obvious. South is written for north and even for east. Between the 17 and 18 October he shows the distance from Spartel as having increased by 105 miles, while the distance made good was only 45. Of course the explanation for this may be that the noon position is an observed one, for the Sun was visible that day, and the course and distance may be dead reckoning only, but this shows how difficult it is to determine what he really was trying to do.

At the date in question, charts were not graduated for longitude and recourse had to be made to the various navigational manuals in which tables of latitudes and longitudes were generally given. These manuals differed among themselves, a matter which was still a source of complaint in a letter from Captain John Gascoigne to the Admiralty in 1737, and we have no means of knowing which ships were using which books. The prime meridian was not the same for all these works. In the following table, which compares a number of publications, all longitudes have been reduced to that of Scilly Light, since it was their D.R. positions relative to these islands which were to prove important to the ships of the squadron. Since the latest editions (1707) have not been available I have, in the case of works which ran into several editions, given those for the nearest years which I have been able to find before and after the catastrophe.

	Sturmy		Seller		Newhouse
	1669	1684	1672	1711	1701
London	$6^{\circ} 45' E.$	$6^{\circ} 45' E.$	—	$6^{\circ} 44' E.$	—
Lizard	$1^{\circ} 21' E.$	$1^{\circ} 21' E.$	$2^{\circ} 50' E.$	$1^{\circ} 11' E.$	$2^{\circ} 50' E.$
Scilly	0	0	0	0	0
Spartel	—	—	$1^{\circ} 48' E.$	$0^{\circ} 25' W.$	$1^{\circ} 48' E.$
Teneriffe	$8^{\circ} 7' W.$	$8^{\circ} 7' W.$	$9^{\circ} 47' W.$	$10^{\circ} 9' W.$	$9^{\circ} 47' W.$
	Colson		Wakeley		
	1697	1716	1694	1746	
London	$6^{\circ} 50' E.$	$6^{\circ} 44' E.$	$6^{\circ} 45' E.$	$6^{\circ} 45' E.$	
Lizard	$0^{\circ} 50' E.$	$1^{\circ} 21' E.$	$1^{\circ} 21' E.$	$1^{\circ} 21' E.$	
Scilly	0	0	0	0	
Spartel	$1^{\circ} 50' W.$	$1^{\circ} 50' W.$	—	$0^{\circ} 55' E.$	
Teneriffe	$14^{\circ} 10' W.$	$10^{\circ} 46' W.$	$10^{\circ} 45' W.$	$10^{\circ} 30' W.$	

A modern determination is: London  $6^{\circ} 21' E.$   
Lizard  $1^{\circ} 9' E.$   
Scilly 0

Spartel  $0^{\circ} 26' E.$   
Teneriffe  $10^{\circ} 17' W.$

If we consider the longitudes recorded on 1 October in the three ships where some officers used Teneriffe and some Spartel as their prime meridian, and in each ship add together the means of the longitudes west of Spartel and east of Teneriffe we should get pretty fair estimates of their idea of the difference of longitude between these two places, for being

only one day at sea their reckonings should still have been fairly accurate. These give the differences of longitude as  $12^{\circ} 12'$ ,  $12^{\circ} 14'$  and  $12^{\circ} 30'$ . Now the nearest difference of longitude to these figures is  $12^{\circ} 20'$  found in Colson's *Seaman's New Kalendar* of 1697, a book quite likely to have been found at sea. On the other hand Richard Rymer, master of the *Swiftsure*, when he changed his prime meridian in the middle of the voyage seems to have worked on a difference of longitude of about  $9^{\circ} 30'$ , which is closer to that given in the later editions of Seller's *Practical Navigation*.

Lieutenant Anthony Lochard of the *Orford* provides us with a different key, if only we could find a lock in which it would fit. On 19 October he tells us that he was  $8^{\circ}$  west of the Lizard and  $8^{\circ} 48'$  west of Spartel. This would mean that Spartel was  $0^{\circ} 48'$  east of the Lizard and Colson says it is  $2^{\circ} 40'$  west. Even in 1716 Colson gives Spartel as  $0^{\circ} 37'$  west of the Lizard. Lochard then confuses the matter by giving a bearing and distance of the Lizard which would make the difference of longitude between the two headlands as  $1^{\circ} 16'$ .

Navigationally Lochard's is one of the best of the log-books. Each noon he gives the bearing and distance of Spartel, the departure and difference of longitude from it, the D.R. latitude and, when he got one, the observed latitude, and the course and distance made good from the previous noon.

There are a few obvious mistakes. On 1 October he gives his latitude as  $35^{\circ} 5'$  when he means  $36^{\circ} 5'$ . On 20 October the distance from Spartel is less than half what it should be. Working back from the distances and bearings of Spartel the departures will usually be found to be correct within two miles, but the differences of latitudes are not. We do not know what latitude he was taking as that of Spartel but if he was using the  $35^{\circ} 41'$  of the 1697 edition of Colson the differences of latitude would be in error up to as much as 14 miles on occasions. The differences in longitude worked from the departures are generally fairly accurate but here too there are a few glaring errors.

In Fig. 2 I have plotted Lochard's track. The single circles show his D.R. positions at noon, the double circles the observed positions and the treble circle the single case when both agreed. The latitudes logged have been used and the differences of longitude from Spartel measured from  $5^{\circ} 55'$  west, the actual position. The hard lines show the courses and distances entered as having been made good from noon to noon, the arrow-heads indicating the noon positions obtained by this means. The triangles show the noon positions obtained from the bearings and distances of Spartel. In plotting these I have thought it best to take  $35^{\circ} 41'$  as the latitude but to retain the true value of  $5^{\circ} 55'$  for the longitude of Cape Spartel. This seemed to give the best comparable positions.

The double triangles give the noon positions relative to the Lizard, the true position of  $49^{\circ} 58'$  North,  $5^{\circ} 12'$  West being used to measure them from.

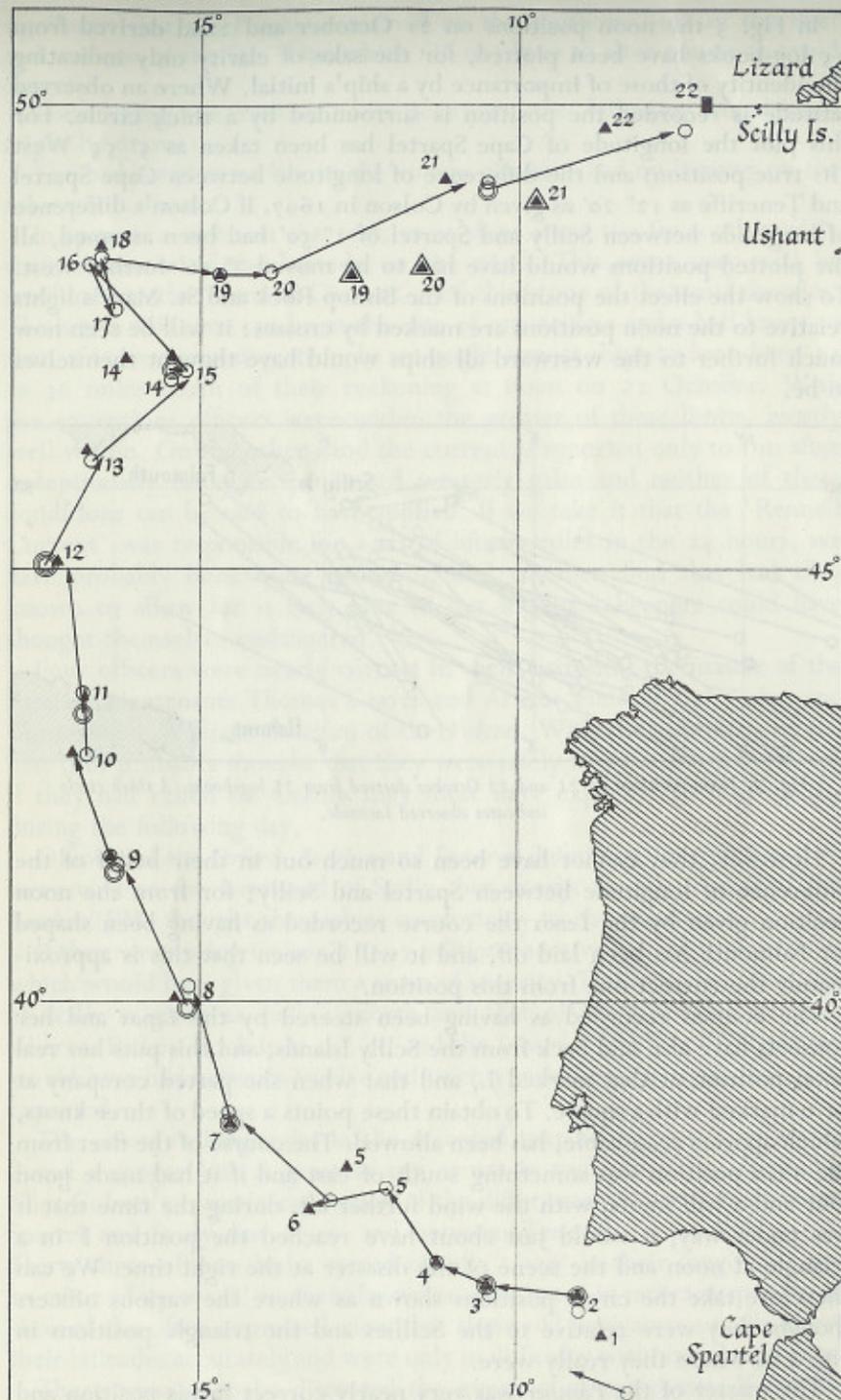


Fig. 2. Lieutenant Lochard's track. Single circles show D.R. positions at noon; double circles observed positions; the treble circle when both agreed.

In Fig. 3 the noon positions on 21 October and 22nd derived from 35 log-books have been plotted, for the sake of clarity only indicating the identity of those of importance by a ship's initial. Where an observed latitude is recorded the position is surrounded by a thick circle. For this plot the longitude of Cape Spartel has been taken as  $5^{\circ} 55'$  West (its true position) and the difference of longitude between Cape Spartel and Teneriffe as  $12^{\circ} 20'$  as given by Colson in 1697. If Colson's difference of longitude between Scilly and Spartel of  $1^{\circ} 50'$  had been assumed, all the plotted positions would have had to be moved  $2^{\circ} 16'$  further west. To show the effect the positions of the Bishop Rock and St. Mary's lights relative to the noon positions are marked by crosses: it will be seen how much further to the westward all ships would have thought themselves to be.

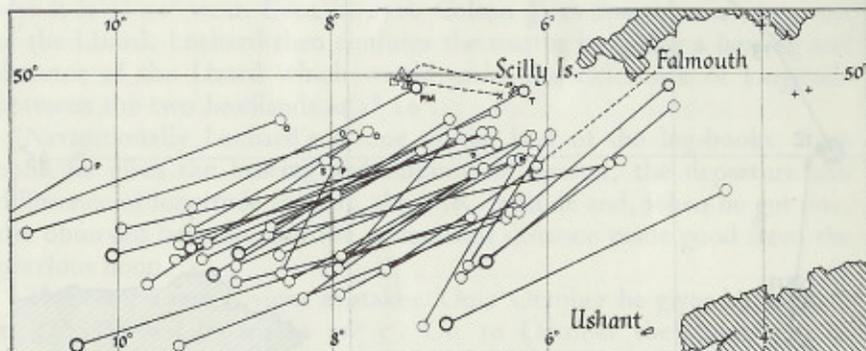


Fig. 3. Noon positions on 21 and 22 October derived from 35 log-books. A thick circle indicates observed latitude.

However, they cannot have been so much out in their belief of the difference of longitude between Spartel and Scilly; for from the noon position given by the *Lenox* the course recorded as having been shaped for Falmouth has been laid off, and it will be seen that this is approximately the correct one from this position.

The courses recorded as having been steered by the *Lenox* and her consorts have also laid back from the Scilly Islands, and this puts her real noon position at that marked L, and that when she parted company at 11.0 marked with a square. To obtain these points a speed of three knots, which appears reasonable, has been allowed. The course of the fleet from the 11.0 position was something south of east and if it had made good four and a half knots, with the wind further aft, during the time that it was under way, it would just about have reached the position F in a triangle at noon and the scene of the disaster at the right time. We can therefore take the circle positions shown as where the various officers thought they were relative to the Scillies and the triangle positions in Fig. 2 as where they really were.

The master of the *Panther* was very nearly correct in his position and must have thought that the fleet was standing into danger. Is it perhaps

significant that the *Panther* remained on the southern flank of the fleet and was one of the few ships which did not have to alter course to avoid danger?

Considering the various noon positions, the following conclusions might be drawn:

The bad weather earlier in the voyage can have had no bearing on the subsequent disaster.

In spite of a sight on the 21st, most ships were too far southward in their estimates of the latitude on the 22nd. This error may well be attributed to the 'Rennell Current', and this is one of the usual theories. The set in this area can be at the rate of one to one-and-a-half knots so that, if it were running strongly we might expect ships to have been 24 to 36 miles north of their reckoning at noon on 22 October. With five exceptions officers were within the greater of these limits, mostly well within. On the other hand the current is reported only to run after exceptionally heavy or prolonged westerly gales and neither of these conditions can be said to have applied. If we take it that the 'Rennell Current' was responsible for a set of fifteen miles in the 24 hours, we have probably been quite generous, and we then find that had they known to allow for it only nine of our log-book keepers could have thought themselves endangered.

Four officers were nearly correct in their latitudes, the master of the *Panther*, Lieutenants Thomas Graves and Arthur Field of the *Torbay* and Commander William Ockman of the *Vulcan*. With the exception of the first they probably thought that they were safely to the eastward, though if they had relied on Colson they must have expected to make Scilly during the following day.

Officers of the *Orford*, *Panther* and *Somerset* definitely thought that they were well to the westward of Scilly, but except for the master of the *Panther* (PM) thought themselves comfortably to the southward.

If they were using Colson's 1697 edition there was another error here which would have given them a sense of security. The latitude of the Isles of Scilly is given as  $50^{\circ} 12'$  north and that of the Lizard as  $50^{\circ} 10'$ , whereas Bishop Rock is in  $49^{\circ} 52'$  and the Lizard is in  $49^{\circ} 58'$ . Thus they would have had between twelve and twenty miles less sea room than they expected.

The errors in longitudes in the accepted text-books must have introduced a danger just as great as any errors in reckoning the longitude. Thus Colson's error in estimation of the difference of longitude between Spartel and Scilly was  $2^{\circ} 16'$  and between Teneriffe and Scilly  $3^{\circ} 53'$ . Thirty-three officers had a spread of only  $2^{\circ} 20'$  in their longitudes and an error of up to  $48'$  in their latitudes. The latter is rather surprising in view of the often expressed view that these old navigators usually knew their latitudes accurately and were only in difficulty with their longitudes.

There remains to be discussed the question of compasses. If the inaccuracy of these had been the sole cause, as was suggested by Sir

William Jumper, their errors would have had to vary between  $7^{\circ}$  east for the *Monmouth* and  $4^{\circ}$  west for the *Panther*. But of course in each ship there was sometimes quite a spread of longitude and as officers of one ship would have all been navigating by a single compass, the error of this instrument while it might have been a contributory cause could not have been the sole one.

At this date very few indeed knew of the possible existence of deviation of the compass caused by magnetic material in the ship and none understood it. All records of ships of this build indicate that where there was any deviation the effect was to cause a vessel to be to the southward of her course when steering easterly or westerly. In this case all ships were to the northward of their reckoning so nothing can be made of this possibility.

There is one other point in connection with the compass; I cannot find any mention of an allowance being made for variation. This would have increased progressively from  $4^{\circ}$  to  $7^{\circ}$  west as the voyage progressed and if not allowed for would have placed the ships one or two degrees to the westward of their reckoning.

In conclusion, it seems that while the 'Rennell Current' and bad compasses might have contributed to the disaster, much more must be attributed to the lack of accurate knowledge of geographical positions and the low standard of accuracy of navigational practice.

<sup>1</sup> The ships which came home with Shovel were: *Royal Ann*, 100; *Association*, 96; *St. George*, 90; *Somerset* and *Torbay*, 80; *Eagle*, *Lenox*, *Monmouth*, *Orford* and *Swiftsure*, 70; *Panther* and *Romney*, 54; *Rye*, 32; *Cruiser* and *Valeur*, 24; *Weazel*, 10; *Griffin*, *Isabella*, *Phoenix* and *Vulcan*, 8; *Firebrand*.

#### Professor E. G. R. Taylor writes:

Commander May has done a great service by his analysis of the log-books of the officers of Sir Cloudisley Shovel's fleet. His figures confirm the suspicion that the level of navigational practice in the Navy was then decidedly poor. Lieutenant Edward Harrison (himself trained in the East India service) pointed out that the new printed form then (1691) being handed out by the Admiralty for writing up the log had no column for compass variation. Nor had he himself ever seen an azimuth compass aboard ship during his naval service. Edmund Halley's new Channel chart published in 1700 gave the variation in the area of the Scilly Isles as  $7^{\circ}\frac{1}{2}$ , while he placed the Bishop Rock in  $49^{\circ}49'$ , only seven miles too far north. But since a naval officer had to provide his own equipment, we cannot be surprised that this was not always the best available.

## Space Navigation

THE following discussion took place at an Ordinary Meeting of the Institute held at the Royal Geographical Society in London on 19 February 1960, with the President, Wing Commander E. W. Anderson, O.B.E., D.F.C., A.F.C., in the Chair. Dr. J. G. Porter is at the Royal Greenwich Observatory, Herstmonceux, Mr. D. J. Cashmore and Mr. T. McClymont are both with English Electric Aviation Limited.

#### Dr. J. G. Porter

It is ten years ago since the Institute first heard the subject of space navigation discussed by Arthur Clarke and Dr. R. d'E. Atkinson in this very room. Quite a lot has happened in the intervening years, and what was then considered to be a romantic dream has now become a very topical reality. I hope that the accounts of the subject given to you this afternoon will give some indication of the manner in which this problem is being tackled.

Space navigation is far more difficult than navigation on Earth. Instead of two dimensions there are three, but they are not clearly defined. In space there is no horizon, no pole for reference; there is no up or down since there is no Earth to act on a plumb-line. Although there is the advantage that one can see one's target, it is not yet possible to drive the ship straight towards it. The very drastic need for economy of fuel compels us, for the present at least, to rely entirely on gravity—to allow the ship to follow an orbit about the Sun until it reaches the predetermined point of contact with the distant planet.

The difficulties can perhaps be realized if we remember that the Earth is itself a space ship. If we stand on a clear night and look up at the stars, we have no sense of motion, although the Earth is travelling at 65,000 miles an hour; and still less are we able to say in which direction the Earth is moving. Yet this is the fundamental problem of space navigation—it is not sufficient to find out where we are, for we must know if we are travelling in the correct orbit so that at some future time, perhaps months ahead, we shall make the required landing.

Let us consider then the pioneer problems of space flight. In the distant future, when ships can be driven continuously, when the planets and their satellites are provided with radio beacons, and all the initial difficulties have been overcome, there will clearly be no case for this kind of navigation. It is the initial efforts of interplanetary flight that interest us, and of these only one part will be discussed this afternoon. The trip to a distant planet may be divided into three stages—first comes the launch from the Earth, then follows the major part of the trip in which the ship is in free fall, influenced solely by the gravitational field of the Sun and planets, and finally the ship will make a controlled landing on the planet. We shall assume that the first and last stages, which involve only distances which are astronomically quite small, can be controlled