

APPENDIX 1

(referred to in paragraphs 1.9 and 14.36)

Organisations and individuals who submitted evidence

In addition to the *Civil Aviation Authority the following organisations and individuals submitted written evidence or other information. Representation at hearings is indicated by an asterisk.

- *Aerodrome Owners Association
- Aircraft Owners and Pilots Association
- *Air Transport Operators Association Ltd
- Airwork Ltd
- Bournemouth—Hurn Airport
- *Bristow Helicopters Ltd
- *Britannia Airways Ltd
- *British Caledonian Airways Ltd } also represented seven other
} independent British airlines
- *British Air Line Pilots Association
- *British Airports Authority
- *British Airways
- British Civil Aviation Standing Conference
- British Helicopter Advisory Board Ltd
- Mr Michael L Burlyn
- *Business Aircraft Users Association Ltd
- Cardiff—Wales Airport
- *Central Trade Union Side of the CAA
- Mr Gerald Davies
- East Midlands Airport
- Edinburgh Airport Consultative Committee
- *General Aviation Manufacturers and Traders Association Ltd
- Mr Carl Graham-Clark
- *International Aeradio PLC
- International Air Transport Association
- *Joint Airports Committee of Local Authorities
- Leeds and Bradford Airport
- Liverpool Airport
- Loganair Ltd
- *Luton International Airport
- Manchester International Airport Authority
- National Joint Council for Local Authorities
- Captain A C D Mitchell
- Smiths Industries Aerospace & Defence Systems Company
(a business in Smiths Industries PLC)
- Southend Airport
- Tees-side Airport
- Department of Trade
- Transport Industries Committee of the Trades Union Congress
- Walmore Electronics Ltd
- Mr D W Ward

APPENDIX 2
(referred to in paragraph 2.1)

**Summary of the responsibilities of the
Civil Aviation Authority (CAA)**

The CAA is both a public service enterprise and a regulatory body. Its responsibilities include:

The National Air Traffic Services, both air traffic control and telecommunications, in conjunction with the Ministry of Defence.

The economic regulation of the civil aviation industry, including air transport licensing and approval of air fares, and the licensing of air travel organisers.

Air safety, both airworthiness and operational safety, including the licensing of flight crew, aircraft engineers and aerodromes, and the certification of United Kingdom airlines and aircraft.

Advice to the Government on civil aviation matters, both domestic and international.

Consumer interests; private aviation requirements; economic and scientific research; the collection and publication of economic and statistical data; and consultancy and training for overseas administrations.

The ownership and operation of eight aerodromes in the Scottish Highlands and Islands.

(This summary appeared at the inside front cover of the Authority's Annual Report and Accounts 1981-82.)

APPENDIX 3

(referred to in paragraphs 2.1, 4.2, 9.8 and 14.2)

Civil Aviation Act 1971

Directions to the Civil Aviation Authority under section 28(2)

The Secretary of State in exercise of his powers under section 28(2) of the Civil Aviation Act 1971 (hereinafter called 'the Act') hereby gives the following Directions to the Civil Aviation Authority (hereinafter called 'the Authority').

1. These Directions may be cited as the Civil Aviation Authority (Air Navigation Services) Directions 1976, and shall come into operation on 1 March 1976. The Civil Aviation Authority (Air Navigation Services) Directions 1972 are hereby revoked.

2. The Authority shall join with the Secretary of State for Defence in relation to the matters specified in section 28(2)(a) and (b) of the Act in the manner specified in the following paragraphs.

3. The Authority shall collaborate with the Secretary of State for Defence in exercising its functions in providing air navigation services through a joint organisation known as the National Air Traffic Services (hereinafter referred to as 'NATS'). NATS shall be manned jointly by civilian staff of the Authority and by personnel of the Services and civilian staff to be made available by the Secretary of State for Defence, and shall make use of civil and military facilities and installations as appropriate. The senior officer of NATS shall be known as the Controller, his deputy as the Deputy Controller, and the officer in charge of operations in the field as the Joint Field Commander.

4. The services provided through NATS shall be available to all classes of civil and military aircraft both within the United Kingdom national airspace and within any airspace for which the United Kingdom has in pursuance of international arrangements undertaken to provide such services (hereinafter referred to as 'the United Kingdom ATC airspace').

5. The services provided through NATS shall be planned, provided and operated so as to secure the safe operation of aircraft. Subject to this and the other requirements of flight safety, and having regard to costs, the planning, provision and operation of the services shall take full account of:

- (i) the need to maintain the most expeditious flow of air traffic as a whole consistent with the optimum utilisation of individual aircraft;
- (ii) the environmental impact of civil aircraft operations and in particular the disturbance to the public arising from aircraft noise, vibration and pollution.

The services shall be operated in such a way as to reconcile the differing civil and military air traffic operational needs in order to assist efficient and economic operations by civil aircraft, while having full regard to the operational and training requirements of military aircraft, but without according preferential treatment to either civil or military users as such. In the planning or airspace arrangements, the requirements of all air user interests, including general aviation, shall be taken into account.

6. The functions exercised jointly through NATS shall include:

- (a) subject to the provisions of sub-paragraph (c) of this paragraph the provision of services within the United Kingdom ATC airspace and the taking of decisions as to the nature and scale of such services in consultation with the users as necessary and taking into account the cost of the services and the means of recovering that cost;
- (b) ensuring that the relevant international agreements binding on the United Kingdom are observed where applicable and in any case of doubt as to the interpretation of such agreements seeking the advice of the appropriate Secretary of State thereon;
- (c) the provision of services to aircraft in the upper airspace to enable the Secretary of State to discharge his obligations under the contracts concluded from time to time between the Secretary of State and the European Organisation for the Safety of Air Navigation (Eurocontrol);
- (d) the provision and operation of approach and aerodrome control services at such civil aerodromes as may be determined by the Authority, and dealing with such matters relating to those services at Ministry of Defence airfields as may be agreed with the Secretary of State for Defence;
- (e) in consultation with all interested users advising on air traffic control aspects of establishing danger, restricted or special flying areas with a view to ensuring the efficient use of the United Kingdom ATC airspace;
- (f) advising the Secretary of State for Defence and the Secretary of State for Trade on the air traffic control aspects of any proposals to establish new or reactivate disused civil and military aerodromes and on problems connected with aerodrome traffic patterns on which advice is sought.

7. The Authority shall assist the Air Traffic Control Board appointed by the Secretary of State for Defence and the Secretary of State for Trade in any review of the services which the Board may from time to time carry out and may refer to the Air Traffic Control Board for advice any questions of special difficulty arising between NATS and operators of aircraft or organisations representative of operators of aircraft, which cannot be resolved in discussion.

8. The Authority shall not make any major changes in the structure, organisation and manning arrangements of any part of NATS which is staffed in whole or in part by persons designated for that purpose by the Secretary of State for Defence except with the consent of the Secretary of State for Defence.

Appointments to the posts of Controller, Deputy Controller and Joint Field Commander shall be made jointly by the Authority and the Secretary of State for Defence and before the appointment of any person to be Controller the Authority shall obtain the consent of the Secretary of State for Trade.

9. The cost-sharing arrangements existing between the Secretary of State for Trade and the Secretary of State for Defence before 1 March 1976 shall apply between the Authority and the Secretary of State for Defence until otherwise mutually agreed. Where a facility or service, the cost of which is not taken into account in the existing cost-sharing arrangements, is to be provided on a cost-sharing basis through NATS, the cost, except the cost of discharging any liability to a third party incurred in the course of providing such facility or service, shall be borne proportionately by the Authority and the Secretary of State for Defence having regard to the extent to which the facility or service is expected to be used by civil and military aircraft respectively. The proportions shall be agreed between the Authority and the Secretary of State for Defence before the decision to provide the facility or service is taken and shall be reviewed by the parties from time to time in the light of any change in the expected use of the facility or service.

Where the Authority and the Secretary of State for Defence agree that the cost of a facility or service provided through NATS is to be wholly borne by the Authority or the Secretary of State for Defence, and that cost is not taken into account in cost-sharing arrangements, the Authority or, as the case may be, the Secretary of State for Defence may raise a fully economic charge on the other party for any use made of that facility or service by military or, as the case may be, civil aircraft, unless, in the particular case, a charge is raised against some other person.

10. Any disagreements between the Authority and the Secretary of State for Defence which cannot be resolved in discussion shall be referred by the Authority to the Secretary of State for Trade for consideration in consultation with the Secretary of State for Defence.

PETER SHORE,
Secretary of State for Trade

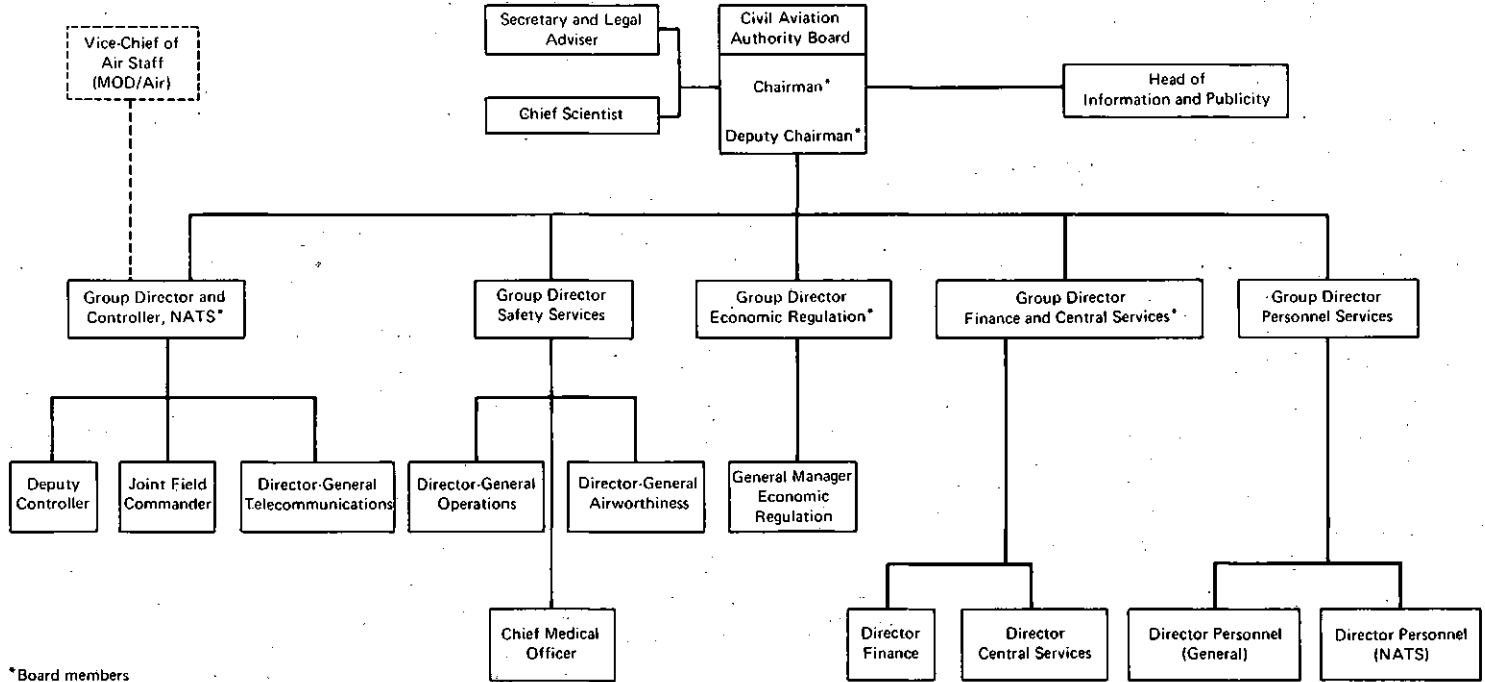
ROY MASON,
Secretary of State for Defence

9 February 1976

(Reproduced from Annex B to the White Paper *Future Civil Aviation Policy*, Cmnd 6400.)

APPENDIX 4
(referred to in paragraph 2.12)

Organisation of the Civil Aviation Authority, July 1982

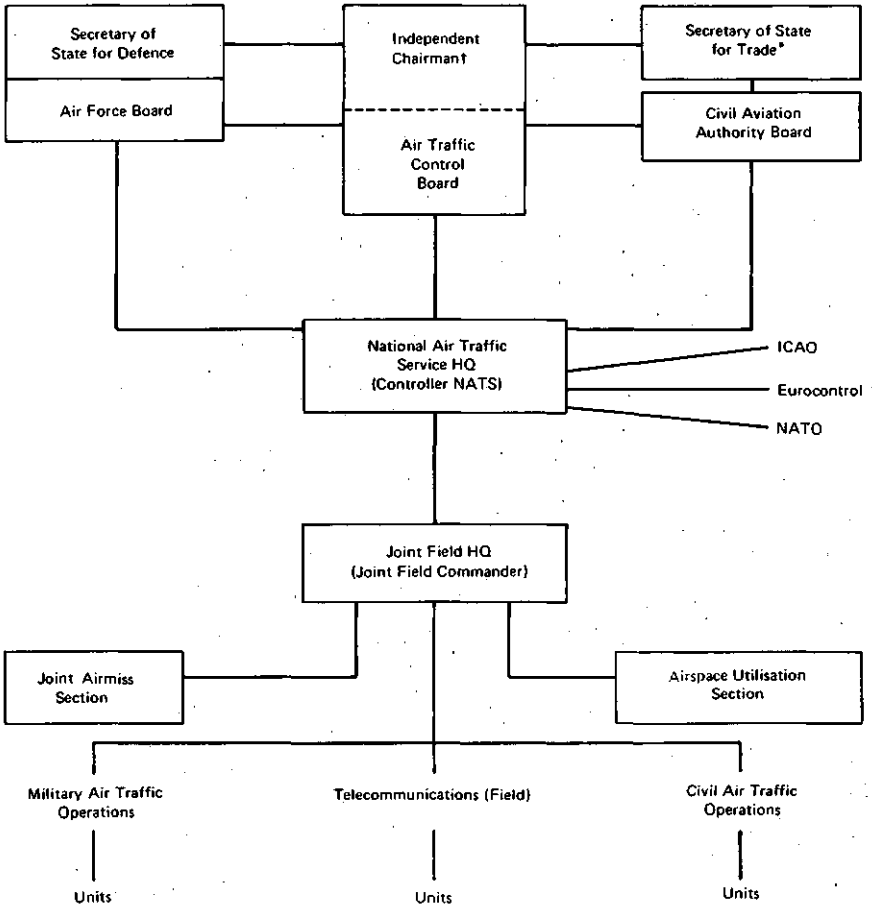


* Board members

Source: CAA.

APPENDIX 6
(referred to in paragraph 2.18)

NATS relationships with Government, international organisations, and its field organisation



*Secretary of State for Transport, from 13 June 1983

†The independent chairman of the ATC Board reports direct to the Secretaries of State

Source: NATS.

APPENDIX 7

(referred to in paragraphs 4.6, 5.5, 6.2, 7.58, 8.22 and 9.105)

The Eurocontrol Multilateral Agreement relating to Route Charges

1. In addition to the United Kingdom, the six other signatories to the Eurocontrol International Convention relating to Co-operation for the safety of Air Navigation¹ and four non-member States have agreed to adopt a common policy (the Multilateral Agreement relating to Route Charges) for charges for en route air navigation facilities and services which they provide in the airspace falling within their competence². The Eurocontrol Agency in Brussels provides a central billing and collection function for the system. A separate charge is calculated in respect of each State overflown, the overall charge for a given flight being obtained by adding together the separate charges. The principal advantage of this Agreement to aircraft operators is that there is thus a single charge for a flight originating in or passing over or terminating in the Eurocontrol area; while each State overflown is credited with its appropriate share of the combined charge.

2. Eurocontrol charges are based on the recovery of a specified level of the costs of providing en route air traffic control by a payment related to the weight of the aircraft and the distance flown.

3. Within Eurocontrol the consultative group on route charges co-ordinates the accounting systems so as to provide a consistent cost base for each State. Costs are reported separately for air traffic services, and for meteorological and aeronautical information services. The member States' share of the headquarters costs of Eurocontrol are included in the national cost bases.

4. Eurocontrol charges constitute about 8 per cent of the direct operating costs of most European-based airlines; for an air taxi operator using smaller aircraft they would be about 16 per cent. The increase in cost recovery rates has risen progressively by agreement from 15 per cent of historic costs in 1971 to 100 per cent of forecast costs in 1982.

5. The charge made for a flight in each State consists of a service unit rate for that State multiplied by a distance factor and a weight factor each relating

¹ The Convention of 1960 was published in the United Kingdom as Cmnd 2114; the Protocol of 1981, amending the 1960 Convention and still to enter into force, was published in the United Kingdom as Cmnd 8662.

² In addition to the United Kingdom, signatories to the Eurocontrol Convention and the Multilateral Agreement relating to Route Charges are: Belgium, France, Federal Republic of Germany, Irish Republic, Luxembourg and the Netherlands. The Agreement was published in the United Kingdom as Cmnd 4916. Austria, Portugal, Spain and Switzerland are associated with the Multilateral Agreement through individual agreements.

to the particular flight. The formula for calculating the charge in each State is given by:

$$\text{Charge} = S \times \frac{\text{distance}}{100} \times \sqrt{\frac{\text{maximum take-off weight}}{50}}$$

where S is the service unit rate particular to a given State.
Distance is measured in kilometres and weight in tonnes.

The service unit rate

6. The service unit rate is set annually for each State from 1 April and expressed in US dollars at the exchange rate ruling in November of the previous year. The rate is established so that a State's forecast cost base for the financial year is fully recovered by the distance and weight factors of all the chargeable flights (service units) forecast for the year. Windfall gains and losses can thus arise in a given year from Eurocontrol revenue due to fluctuations in the dollar exchange rate and errors in forecasting the cost base and chargeable traffic. Allowance for such surpluses and shortfalls is made in the cost base of the next year but one.

7. The service unit rates of charge¹ imposed in respect of the air space of the United Kingdom and that of each of the other Eurocontrol States are from 1 April 1983²:

	<i>US \$</i>
United Kingdom	64.15
Belgium/Luxembourg	42.49
France	31.83
Federal Republic of Germany	47.39
Irish Republic	35.26
Netherlands	48.42
Austria	43.11
Portugal	27.58
Spain (Mainland)	30.29
(Canaries)	29.24
Switzerland	59.00

The distance factor

8. The distance element used for each chargeable flight relates to the distance in kilometres between the airport of departure or the point of entry into the airspace falling within the competence of that State and the airport of first destination or the point of exit from the State's airspace. Entry and exit points correspond to where the air route crosses the FIR boundary and the route is taken as that most frequently used between the two airports.

¹ See Note at the end of this Appendix.

² Promulgated in the United Kingdom by the Civil Aviation (Route Charges for Navigation Services) (Fifth Amendment) Regulations 1983 (SI 1983/332).

9. A deduction of 20 kilometres is made for each take-off and landing to allow for the services provided by the airport approach facilities.

10. The distance element relating to the tariff for that part of a transatlantic flight which goes through the Eurocontrol area is fixed differently. The transatlantic route system of tracks (see paragraph 3.18) varies daily with the pattern of high altitude winds, and entry/exit points may be anywhere on the Western border of the Scottish or London FIRs. The distance element is calculated by reference to an average weighted distance per State, established according to a sample of the air routes followed by the users in the different seasons of the year.

The weight factor

11. Aircraft weight for charging purposes relates to the maximum take-off weight in tonnes. The use of a square root function means that the rate of increase of the charge per tonne decreases sharply for larger aircraft.

12. The cost imposed by an individual aircraft on en route ATC services relates to the degree of separation which these services are providing. The influence of weight on the separation of aircraft, due to the vortex effect, is only relevant at take-off and landing. En route separation is more influenced by speed, which is not related to aircraft weight.

Exempted flights

13. Some flight categories are exempt from the Eurocontrol charging system. Circular flights and non-revenue flights (ie customs, police, search and rescue, test and training flights and those used to check navigational aids) are exempt; as are those conducted under visual flight rules (VFR) by aircraft of less than 5.7 tonnes. In the United Kingdom the NATS en route costs for service to military flights are recovered under the cost-sharing arrangements with MOD, so the costs applying to these flights are excluded from the national cost base. All other exempt flights, eg circular, training and VFR, are included in the calculation of service units. Helicopters operating North Sea services are also exempt from Eurocontrol charges, but are subject to a special charging scheme in respect of services provided for them.

Note (see paragraph 9.105 et seq): The Authority considers that the service unit rate represents only a coarse indicator of the comparative charges and costs in the different States, as the rate can be influenced by a number of underlying factors.

The composition of the cost base between States will vary in accordance with their divergent accounting practices even though there is an agreed set of principles. The estimation of the main cost items—operating and maintenance, administration, depreciation and interest will be treated differently among States. The allocation of costs between en route and other functions and the civil/military cost-sharing arrangements will also be inconsistent and each State will make varying assumptions about the 'credit' to be given for exempted flights.

A significant factor which influences the cost base concerns the complexity of the ATC which needs to be provided to match the traffic offered. The ATC infrastructure becomes more complex and correspondingly more costly as the proportion of in/outbound traffic increases, because the relative difficulty of handling this type of traffic has been estimated to be of the order of 1.75 times that of an overflight for the same flight distance. We were told that overflights represent some 12 per cent of all flights in United Kingdom airspace compared with, for example, some 42 per cent in French airspace.

The pattern of flights within a national airspace has another effect on the service rate, in that a high proportion of holiday flights which overfly for long distances but do not land, means that the number of service units, ie the sum of the products of the distance and weight factors of all flights, is relatively high, reducing the service unit rate required to recover the cost base.

A further factor which influences the comparison of service unit rates is the difference in the average weight of the aircraft overflying each State, as the larger the average aircraft handled for a given distance the lower the corresponding rate needs to be to generate the same revenue.

- Sources: 1. *Appendix*—MMC study.
2. *Note*—MMC, from a paper prepared by Professor Kennaway, sometime Member of the Authority.

APPENDIX 8
(referred to in paragraph 5.3)

**Civil Aviation Authority
Capital structure—1972–73 to 1982–83**

<i>Year ended 31 March</i>	<i>£'000</i>										
(Historic cost basis)	1972–73	1973–74	1974–75	1975–76	1976–77	1977–78	1978–79	1979–80	1980–81	1981–82	1982–83
Fixed assets	25,246	34,455	39,619	44,766	45,475	48,005	60,524	64,223	76,850	76,979	93,041
Rights to use MOD facilities	2,409	2,195	1,954	1,173	2,168	2,816	2,907	2,625	3,152	3,595	3,768
	<u>27,655</u>	<u>36,650</u>	<u>41,573</u>	<u>45,939</u>	<u>47,643</u>	<u>50,821</u>	<u>63,431</u>	<u>66,848</u>	<u>80,002</u>	<u>80,574</u>	<u>96,809</u>
Current assets	9,161	10,071	14,515	20,109	21,776	32,341	36,769	51,105	44,613	56,523	69,483
Less: current liabilities	9,227	12,105	13,754	15,856	17,733	17,558	13,370	20,478	19,237	23,298	17,942
	<u>(66)</u>	<u>(2,034)</u>	<u>761</u>	<u>4,253</u>	<u>4,043</u>	<u>14,783</u>	<u>23,399</u>	<u>30,627</u>	<u>25,376</u>	<u>33,225</u>	<u>51,541</u>
Net assets	27,589	34,616	42,334	50,192	51,686	65,604	86,830	97,475	105,378	113,799	148,350
Less: Provision for income equalisation											16,293
											<u>132,057</u>
<i>Financed by</i>											
Initial debt	27,640	27,640	27,640	27,073	27,073	27,073	27,073	27,073	27,073	—	—
National Loans Fund	—	5,000	21,500	22,700	23,700	36,600	48,900	53,700	55,800	73,800	73,800
Other loans	—	—	—	—	—	—	10,814	20,848	20,057	39,638	44,623
	<u>27,640</u>	<u>32,640</u>	<u>49,140</u>	<u>49,773</u>	<u>50,773</u>	<u>63,673</u>	<u>86,787</u>	<u>101,621</u>	<u>102,930</u>	<u>113,438</u>	<u>118,423</u>
Loan capital	27,640	32,640	49,140	49,773	50,773	63,673	86,787	101,621	102,930	113,438	118,423
Reserves	(51)	1,976	(6,806)	419	913	1,931	43	(4,146)	2,448	361	13,634
	<u>27,589</u>	<u>34,616</u>	<u>42,334</u>	<u>50,192</u>	<u>51,686</u>	<u>65,604</u>	<u>86,830</u>	<u>97,475</u>	<u>105,378</u>	<u>113,799</u>	<u>132,057</u>
<i>Total</i>											

Source: CAA published accounts.

APPENDIX 9
(referred to in paragraph 5.10)

Civil Aviation Authority
Source and application of funds—1977-78 to 1982-83

<i>Year ended 31 March</i>	<i>£'000</i>						
<i>Source of funds</i>	<i>Cumulative</i>						
	<i>1977-78</i>	<i>1978-79</i>	<i>1979-80</i>	<i>1980-81</i>	<i>1981-82</i>	<i>1982-83</i>	<i>1977-78 to</i> <i>1982-83</i>
Grant-in-aid	16,600	13,034	24,400	33,241	5,940	(30)	93,185
Profit/(loss) before grant-in-aid	(15,582)	(14,922)	(28,589)	(26,647)	(8,027)	13,303	(80,464)
Adjustments for items not involving movement of funds:							
Depreciation	6,917	6,045	8,863	9,711	22,508	9,615	63,659
Other	—	—	—	(313)	3,001	6,099	8,787
Proceeds on disposal of fixed assets	394	1,627	118	146	533	248	3,066
Borrowings from National Loans Fund	12,900	12,300	4,800	2,100	18,000	—	50,100
Borrowings from other sources	—	10,814	10,034	—	17,600	—	38,448
	<u>21,229</u>	<u>28,898</u>	<u>19,626</u>	<u>18,238</u>	<u>59,555</u>	<u>29,235</u>	<u>176,781</u>
<i>Application of funds</i>							
Expenditure on fixed assets (net)	9,341	19,945	12,331	22,175	22,812	25,498	112,102
Expenditure on rights to use MOD facilities	1,149	337	67	836	801	600	3,790
Repayment of borrowings—Initial debt	—	—	—	—	27,073	—	27,073
—Other	—	—	—	478	1,020	1,114	2,612
Increase/(decrease) in working capital	6,939	9,961	(2,054)	4,925	7,704	12,685	40,160
Provision for income equalisation	—	—	—	—	—	(16,293)	(16,293)
Increase/(decrease) in net liquid funds	3,800	(1,345)	9,282	(10,176)	145	5,631	7,337
	<u>21,229</u>	<u>28,898</u>	<u>19,626</u>	<u>18,238</u>	<u>59,555</u>	<u>29,235</u>	<u>176,781</u>

Source: CAA.

APPENDIX 10
(referred to in paragraph 5.18)

**Civil Aviation Authority
Summary of financial results—1972–73 to 1982–83**

<i>Year ended 31 March</i>	<i>£'000</i>										
	1972–73	1973–74	1974–75	1975–76	1976–77	1977–78	1978–79	1979–80	1980–81	1981–82	1982–83
Income	19,114	22,553	30,361	44,555	65,271	90,273	103,835	119,572	151,637*	206,255*	239,405*
Operating profit/(loss) before depreciation	(23,299)	(24,703)	(34,341)	(42,343)	(32,116)	(2,604)	(1,679)	(11,351)	(7,674)	28,766	58,313
Depreciation	3,748	4,015	5,285	6,193	6,905	6,917	6,045	8,863	9,711	22,508	9,615
Profit/(loss) before interest and grant-in-aid	(27,047)	(28,718)	(39,626)	(48,536)	(39,021)	(9,521)	(7,724)	(20,214)	(17,385)	6,258	48,698
Interest receivable	—	—	57	223	276	120	630	1,342	2,263	1,617	2,280
Cost of borrowing	2,004	2,420	3,517	4,962	5,261	6,181	7,828	9,717	11,525	15,902	21,382
Provision for income equalisation											16,293
Profit/(loss) before grant-in-aid	(29,051)	(31,138)	(43,086)	(53,275)	(44,006)	(15,582)	(14,922)	(28,589)	(26,647)	(8,027)	13,303
Grant-in-aid	29,000	33,000	34,500	60,500	44,500	16,600	13,034	24,400	33,241	5,940	(30)
Profit/(loss)	(51)	1,862	(8,586)	7,225	494	1,018	(1,888)	(4,189)	6,594	(2,087)	13,273

Source: CAA published accounts.

*Income includes grants from the Scottish Development Department of £2.7 million in 1980–81, £3.8 million in 1981–82 and £3.6 million in 1982–83.

APPENDIX 11
(referred to in paragraph 5.24)

Air traffic services: Operating results—1975-76 to 1982-83

Year ended 31 March	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	£'000 1982-83
INCOME								
Navigation services charges								
— UK Domestic	10,374	13,906	29,551	44,705	58,587	58,741	74,926	104,844
— Oceanic	2,430	3,538	3,990	4,389	4,529	5,982	6,992	8,478
— Airports	14,747	21,307	22,623	25,237	27,832	35,346	39,544	42,458
— North Sea helicopters	—	—	—	295	512	952	933	1,607
Navigation Services to MOD	5,365	4,987	7,745	7,622	9,628	12,469	12,983	14,893
Landing and related charges								
— Scottish Aerodromes	316	567	912	1,717	1,057	1,917	1,968	1,900
— Sumburgh oil-related	—	—	—	—	4,431	7,274	6,960	4,103
Scottish Development Department grant	—	—	—	—	—	2,700	3,830	3,634
Other	2,120	3,420	3,937	4,166	4,458	5,022	5,379	4,988
Exchange gains/(losses)	—	5,618	5,722	(2,572)	(12,623)	(5,316)	22,795	21,477
TOTAL INCOME	35,352	53,343	74,480	85,559	98,411	125,087	176,310	208,382
EXPENDITURE								
Direct staff costs	34,584	35,558	35,066	39,631	46,947	59,591	65,194	68,729
ERNIC	1,883	2,453	3,062	2,943	3,640	4,588	5,354	4,922
Superannuation	5,193	5,231	5,145	5,870	11,764	14,747	16,290	17,053
Other indirect staff costs	2,324	2,029	2,153	2,413	3,028	3,495	3,877	4,198
Premature retirement	—	—	—	—	—	187	385	447
STAFF COSTS	43,984	45,271	45,426	50,857	65,379	82,608	91,100	95,349

APPENDIX II contd.

MET services	7,043	8,246	6,219	8,770	11,887	13,559	12,846	11,649
MOD navigational services	4,591	4,146	4,960	4,834	4,974	6,396	7,323	6,910
Telephone and telex	3,673	4,086	4,331	4,044	4,084	4,811	5,808	6,354
Rents	2,603	2,179	2,030	2,082	2,141	2,304	2,134	2,386
Rates	1,916	1,799	1,211	2,375	3,241	1,933	3,675	4,284
Aerodromes security levy	—	—	—	276	188	284	230	102
Other services and materials	2,517	4,291	3,889	3,493	4,896	6,218	6,417	6,566
SERVICES AND MATERIALS	22,343	24,747	22,640	25,874	31,411	35,505	38,433	38,251
DOE/PSA	716	631	753	627	870	254	737	668
Other	2,422	1,815	2,762	3,536	4,487	6,291	6,421	6,146
REPAIRS AND MAINTENANCE	3,138	2,446	3,515	4,163	5,357	6,545	7,158	6,814
RESEARCH AND DEVELOPMENT	1,237	1,156	1,091	1,292	1,845	1,982	2,814	2,645
DEPRECIATION	5,973	6,557	6,881	6,988	8,551	9,256	8,914	9,096
Irrecoverable VAT	922	1,008	1,137	1,205	2,152	2,735	3,250	2,302
Provision for bad and doubtful debts	200	215	471	(265)	288	102	2,009	1,545
Travel and subsistence	1,130	1,271	1,348	1,647	2,139	1,968	2,387	2,780
Other	1,083	1,495	1,452	1,912	2,110	2,458	2,497	2,395
OTHER OPERATING COSTS	3,335	3,989	4,408	4,499	6,689	7,263	10,143	9,022
TOTAL OPERATING COSTS	80,010	84,166	83,961	93,673	119,232	143,159	158,562	161,177
OPERATING PROFIT/(LOSS)	(44,658)	(30,823)	(9,481)	(8,114)	(20,821)	(18,072)	17,748	47,205

Source: CAA.

APPENDIX 12
(referred to in paragraph 5.24)

**United Kingdom airspace air traffic services:
Operating results—1977-78 to 1982-83**

<i>Year ended 31 March</i>	<i>£ million</i>					
	<i>1977-78</i>	<i>1978-79</i>	<i>1979-80</i>	<i>1980-81</i>	<i>1981-82</i>	<i>1982-83</i>
<i>Income</i>	43.4	51.0	57.2	67.9	112.6	144.1
<i>Operating costs</i>						
Staff costs	26.9	30.2	39.0	49.3	54.8	58.8
Services and materials	17.3	19.6	23.5	27.5	29.0	28.5
Repairs and maintenance	1.9	2.4	2.9	3.6	3.9	3.9
Research and development	0.7	0.7	1.4	1.6	2.3	1.9
Depreciation	5.2	5.1	5.4	5.2	5.0	5.5
Other costs	3.2	2.9	4.7	5.2	8.0	7.0
	55.2	60.9	76.9	92.4	103.0	105.6
Operating profit/(loss)	(11.8)	(9.9)	(19.7)	(24.5)	9.6	38.5
Cost of borrowing	4.4	5.2	4.3	4.8	9.2	14.5
Provision for income equalisation (see paragraph 5.19)	—	—	—	—	—	16.3
Profit/(loss) before grant-in-aid	(16.2)	(15.1)	(24.0)	(29.3)	0.4	7.7

Source: CAA.

APPENDIX 13
(referred to in paragraph 5.24)

**North Atlantic air traffic services:
Operating results—1977-78 to 1982-83**

<i>Year ended 31 March</i>	<i>£ million</i>					
<i>Income</i>	<i>1977-78</i>	<i>1978-79</i>	<i>1979-80</i>	<i>1980-81</i>	<i>1981-82</i>	<i>1982-83</i>
<i>Income</i>	4.0	4.4	4.5	6.0	7.0	8.5
<i>Operating costs</i>						
<i>Staff costs</i>	2.0	2.4	2.8	3.6	3.7	3.9
<i>Services and materials</i>	1.0	1.0	1.1	1.3	1.4	1.4
<i>Other costs</i>	0.4	0.4	0.7	0.6	0.7	0.8
	3.4	3.8	4.6	5.5	5.8	6.1
<i>Operating profit/(loss)</i>	0.6	0.6	(0.1)	0.5	1.2	2.4
<i>Cost of borrowing</i>	0.1	0.3	0.3	0.5	0.7	0.7
<i>Profit/(loss) before grant-in-aid</i>	0.5	0.3	(0.4)	—	0.5	1.7

Source: CAA.

APPENDIX 14
(referred to in paragraph 5.24)

**Airport air traffic services:
Operating results—1977-78 to 1982-83**

<i>Year ended 31 March</i>	<i>£ million</i>					
	<i>1977-78</i>	<i>1978-79</i>	<i>1979-80</i>	<i>1980-81</i>	<i>1981-82</i>	<i>1982-83</i>
<i>Income</i>	25.8	27.9	30.4	38.3	42.9	45.0
<i>Operating costs</i>						
Staff costs	15.1	16.5	20.4	25.9	28.5	28.9
Services and materials	4.0	3.7	4.0	4.8	5.5	5.7
Other costs	3.8	4.4	4.5	5.0	5.3	5.6
	22.9	24.6	28.9	35.7	39.3	40.2
Operating profit	2.9	3.3	1.5	2.6	3.6	4.8
Cost of borrowing	1.3	1.8	1.3	1.4	1.6	2.1
Profit before grant-in-aid	1.6	1.5	0.2	1.2	2.0	2.7

Source: CAA.

APPENDIX 15
(referred to in paragraph 5.24)

**CAA Scottish aerodromes:
Operating results—1977-78 to 1982-83**

<i>Year ended 31 March</i>	<i>£ million</i>					
	<i>1977-78</i>	<i>1978-79</i>	<i>1979-80</i>	<i>1980-81</i>	<i>1981-82</i>	<i>1982-83</i>
<i>Income</i>	1.3	2.2	6.3	12.9*	13.9*	10.8*
<i>Operating costs</i>						
Staff costs	1.5	1.8	3.1	3.8	4.2	3.7
Services and materials	0.4	1.5	2.8	1.9	2.5	2.7
Other costs	0.6	0.9	2.9	3.8	3.8	2.9
	2.5	4.2	8.8	9.5	10.5	9.3
Operating profit/(loss)	(1.2)	(2.0)	(2.5)	3.4	3.4	1.5
Cost of borrowing	0.5	1.2	2.2	2.3	2.3	1.0
Profit/(loss) before grant-in-aid	(1.7)	(3.2)	(4.7)	1.1	1.1	0.5

Source: CAA.

*Includes grant from Scottish Development Department of £2.7 million in 1980-81, £3.8 million in 1981-82 and £3.6 million in 1982-83.

APPENDIX 16
(referred to in paragraph 5.27)

Air Traffic Services
Return on capital employed after interest on historic cost basis—1977-78 to 1982-83

Year ended 31 March	UK airspace air traffic services			CAA Scottish aerodromes			North Atlantic air traffic services			Airport air traffic services		
	Average assets employed	Profit/ (loss)	Return	Average assets employed	Profit/ (loss)	Return	Average assets employed	Profit/ (loss)	Return	Average assets employed	Profit/ (loss)	Return
	£'000	£'000	%	£'000	£'000	%	£'000	£'000	%	£'000	£'000	%
1977-78	40,883	(16,205)	(39.6)	3,710	(1,715)	(46.2)	1,046	504	48.2	10,911	1,574	14.4
1978-79	45,994	(15,124)	(32.9)	11,889	(3,171)	(26.7)	1,707	320	18.7	12,482	1,529	12.2
1979-80	48,261	(23,980)	(49.7)	22,156	(4,690)	(21.2)	3,094	(361)	(11.7)	13,716	249	1.8
1980-81	51,522	(29,296)	(56.9)	25,173	1,146*	4.6	5,566	(46)	(0.8)	15,033	1,232	8.2
1981-82	63,750	387	0.6	24,238	1,067*	4.4	6,982	486	7.0	16,437	1,987	12.0
1982-83	80,784	7,674	9.5	9,407	464*	4.9	6,953	1,654	23.8	19,100	2,749	14.4

Source: CAA.

*Includes grants from Scottish Development Department, 1980-81 to 1982-83.

APPENDIX 17
(referred to in paragraph 5.28)

Air Traffic Services
Indices of operating costs—1975-76 to 1982-83

Year ended 31 March	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	(1977-78 = 100)	
							1981-82	1982-83
Direct staff costs	99	101	100	113	134	170	186	196
Superannuation	101	102	100	114	229	287	317	331
Other staff costs	81	86	100	103	128	159	184	184
<i>Staff costs</i>	97	100	100	112	144	182	201	210
MET Services	113	133	100	141	191	218	207	187
MOD navigational services	92	84	100	97	100	129	148	139
Telephone and telex	85	94	100	93	94	111	134	147
Rent	128	107	100	103	105	113	105	118
Rates	158	149	100	196	268	160	303	354
Other services and materials	65	110	100	97	131	167	171	171
<i>Services and materials</i>	99	109	100	114	139	157	170	170
Repairs and maintenance	89	70	100	118	152	186	204	194
Research and development	113	106	100	118	169	182	258	242
Depreciation	87	95	100	102	124	135	130	132
Other costs	76	90	100	102	152	165	230	205
<i>Total operating costs</i>	95	100	100	112	142	171	189	192
<i>Retail Price Index (at September)</i>	76	86	100	108	126	146	162	174

Source: CAA.

APPENDIX 18
(referred to in paragraph 5.54)

**Civil Aviation Authority
1983 Budget and Planning timetable**

1982 September	October	November	December	1983 January	February	March	April	May	June	July	August
<i>Budget preparation</i> Based on 6 months actuals for 1982-83 plus latest estimate for 1982-83					Budgets completed/ finance reviews with Groups	1983-84 Budget CAA Budget reviews with Group Directors by Budget Committee or Executive Committee	To Executive Committee and Board for approval				
Initial charging proposals formulated	To Board for approval	Income charging proposals to industry	<i>1983-84 Charging proposals</i>		Review proposals with industry representatives	Obtain DOT acceptance	Regulations laid before Parliament where appropriate				
	Request basic data from Group Directors		Preparation of plans by the Groups		Preparation of CAA plan Reviews of plan by Planning Committee	<i>1983 Corporate plan</i>		Executive Committee and Board for approval	Issue to CAA Management, DOT/ Treasury		
1983-84 EFL data to DOT	Costs/income data to SDD	1983-84 EFL agreed with DOT/ Treasury		Investment Review to DOT		Department of Trade and Scottish Development Department SDD grant for 1983-84 negotiated and agreed			Investment review meetings with DOT/Treasury officials to agree IFR figures for years 1984-85 to 1986-87		

Source: CAA.

APPENDIX 19
(referred to in paragraph 5.61)

Air Traffic Services
Comparison of actual operating results with budget—1975-76 to 1982-83

Year end 31 March	1975-76		1976-77		1977-78		1978-79		1979-80		1980-81		1981-82		1982-83	
	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual
<i>£'000</i>																
INCOME																
Navigation services charges:—																
UK Domestic	8,850	10,374	13,594	13,906	30,657	29,551	39,442	44,705	58,254	58,587	60,001	58,741	80,016	74,926	101,625	104,844
Oceanic	2,509	2,430	3,150	3,538	3,960	3,990	4,068	4,389	4,674	4,529	6,577	5,982	7,271	6,992	8,044	8,478
Airports	12,800	14,747	19,228	21,307	22,205	22,623	24,304	25,237	27,950	27,832	36,716	35,346	41,534	39,544	42,235	42,458
North Sea helicopters	—	—	—	—	—	—	346	295	750	512	700	952	1,017	933	1,694	1,607
Navigation services to MOD	3,595	5,365	4,895	4,987	5,621	7,745	6,182	7,622	8,843	9,628	11,706	12,469	13,380	12,983	14,253	14,893
Landing and related charges:—																
Scottish aerodromes	309	316	503	567	713	912	1,275	1,717	1,204	1,057	2,149	1,917	2,335	1,968	1,972	1,900
Sumburgh oil-related	—	—	—	—	—	—	—	—	5,043	4,431	6,890	7,274	6,723	6,960	3,029	4,103
Scottish Development Department grant	—	—	—	—	—	—	—	—	—	—	2,700	2,700	3,830	3,830	4,100	3,634
Other	2,092	2,120	2,238	3,420	3,027	3,937	3,225	4,166	3,538	4,458	4,685	5,022	6,026	5,379	5,192	4,988
Exchange gains/(losses)	—	—	—	5,618	7,521	5,722	2,800	(2,572)	(12,900)	(12,623)	(5,100)	(5,316)	—	22,795	—	21,477
TOTAL INCOME	30,155	35,352	43,608	53,343	73,704	74,480	81,642	85,559	97,356	98,411	127,024	125,087	162,132	176,310	182,144	208,382
OPERATING COSTS																
Staff costs	41,587	43,984	45,337	45,271	46,897	45,426	49,683	50,857	62,250	65,379	84,162	82,608	94,555	91,100	96,797	95,349
Services and materials	17,798	22,343	22,902	24,747	23,954	22,640	25,207	25,874	29,218	31,411	36,817	35,505	43,984	38,433	45,422	38,251
Repairs and maintenance	2,844	3,138	3,169	2,446	2,969	3,515	3,837	4,163	5,060	5,357	5,881	6,545	7,731	7,158	7,549	6,814
Research and development	1,510	1,237	1,685	1,156	1,260	1,091	1,442	1,292	1,503	1,845	1,906	1,982	2,859	2,814	2,829	2,645
Depreciation	4,250	5,973	7,054	6,557	7,045	6,881	7,847	6,988	9,284	8,551	9,119	9,256	9,623	8,914	8,535	9,096
Other operating costs	4,414	3,335	3,646	3,989	4,973	4,408	5,603	4,499	6,768	6,689	7,990	7,263	10,392	10,143	10,250	9,022
TOTAL OPERATING COSTS	72,403	80,010	83,793	84,166	87,098	83,961	93,619	93,673	114,083	119,232	145,875	143,159	169,144	158,562	171,382	161,177
OPERATING PROFIT/(LOSS)	(42,248)	(44,658)	(40,185)	(30,823)	(13,394)	(9,481)	(11,977)	(8,114)	(16,727)	(20,821)	(18,851)	(18,072)	(7,012)	17,748	10,762	47,205

Source: CAA.

Government pricing policy for the nationalised industries

Extract from the White Paper *The Nationalised Industries*
(Cmnd 7131) published in March 1978

'Pricing policy

66. A major theme of the 1967 White Paper¹ was that the nationalised industries should price to cover their long run marginal costs. The NEDO² point out that for the most part they have been unable to follow this principle, not only because of price restraint and adverse market conditions but also because of serious difficulties of interpreting its practical application in particular cases. They agree that pricing policies and investment appraisal criteria should be designed to lead to the most efficient allocation of resources but stress that they should also reflect the particular market and investment environment of each nationalised industry.

67. The Government agrees that for many of the industries prices are market determined to a considerable extent and in some cases completely so. For the industries whose market position gives them scope for setting the prices they charge, the Government sees its main role as determining the overall financial target, and hence the general level of prices charged by that industry, in the light of general policy objectives, including considerations of social, sectoral and counter inflation policy, as well as the need to cover costs including the opportunity cost of capital.

68. It agrees with the NEDO that it is not sufficient for the industries to set the general level of their prices to cover their total costs. Within the overall level of prices, the industries should pay attention to the structure of prices and its relation to the structure of costs. They should ensure that, for example, charges for peak and off-peak usage are properly related to the relative costs of supply, so that the provision of capacity is properly related to the demand for it. Arbitrary cross subsidisation between different groups of consumers, which is one result of intervention in the industries' pricing policies, should be avoided. To ensure that this is happening the Government must satisfy itself that the main elements of an industry's price structure are sensibly related to the costs of supply and the market situation, and that it has developed the necessary information and accounting systems for this purpose. Subject to this, the Government believes that it is primarily for each nationalised industry to work out the details of its prices with regard to its markets and its overall objectives, including its financial target.'

¹ *Nationalised Industries. A review of economic and financial objectives*, Cmnd 3437.

² The Government announced in June 1975 that it had asked the National Economic Development Office to undertake, in accordance with the recommendation of the Select Committee on Nationalised Industries, 'a detailed study of the role of the nationalised industries in the economy and of the way in which they are to be controlled in the future'. NEDO published its report in November 1976.

APPENDIX 21

(referred to in paragraphs 9.71 and 14.21)

Operational planning procedures used in NATS for short-term matching of supply and demand

1. In this Appendix we discuss the various procedures which have been developed in NATS for short-term operational planning. These have been developed in response to changes in traffic demand and to constraints which are outside the direct control of NATS, so as to ensure that ATCOs never exceed their safe workload, and that the best service, with available resources, is provided to operators.

Procedural control and flight plans

2. In the event of radar failure the ATCO must have a fail-safe back-up. The back-up system is called procedural control, which relies on prior knowledge of an aircraft's intended flight track. Under this system, an aircraft is 'metered' into blocks of airspace along its intended flight path and the pilot must report his time over specified ground positions. The intervals between aircraft are such that minimum separations can be guaranteed between reporting points. The progress of an aircraft along its flight path is monitored and recorded manually.

3. Every aircraft using controlled airspace is required to file a flight plan which sets out the planned departure time, the route in terms of airways and navigational marker points, the intended flight level, avionics carried and the type of aircraft. A flight plan allows a measure of 'strategic planning' to be carried out before take-off, such as allocating a departure time to assist demand management (see paragraph 8), co-ordinating the flight with adjacent control areas, and predicting possible conflicts with other flights. The combination of radar surveillance with procedural control allows tactical control decisions to be taken in flight, to resolve developing conflicts as they evolve and to replan flight paths over the very short term to give the most economic fuel route.

Flight plan processing

4. At LATCC, flight plans are stored and processed in the 9020D computer. In other centres the processing is by hand, but the principles are similar. A short time before the planned departure of an aircraft a coded and summarised flight plan is printed on to a paper strip at the airport of departure and relevant adjacent control areas. At take-off the actual departure time is input to the computer, which then revises the estimated time of arrival of the aircraft at relevant points on the intended route. This calculation is made by referring to stored data giving the aircraft's operational parameters, such as rate of climb and cruising speed, current meteorological conditions, and flight levels and track distance. This updated information is transmitted to all other control centres on the flight path, replacing the original flight plan. If ATC instructions result in a change in speed, track or flight level then changes can be input to the computer and the flight plan again updated.

5. Flight plan data are transmitted internationally by the aeronautical fixed telecommunications network (AFTN) and, in the case of some domestic flights, by telex. The Maastricht (Eurocontrol) control has a dedicated data link with flight processing computers at other international centres.

Balancing workload by variation of number of control units

6. Controlled airspace is split both vertically and horizontally into sectors which are each associated with a control position, at which is displayed a radar picture covering the controlled area. It is possible to change the scale of the radar display and present two or more sectors at one control position. This combination of sectors (called 'band-boxing') allows the number of ATCOs to be reduced as the workload diminishes. It is also possible, though less desirable, to allocate additional ATCOs to a single control position to prevent temporary overload. Both these procedures are used. In general, the agreed manpower operational requirement (OR) sets out staff levels to match the expected level of increased demand, but under extraordinary conditions provision of an overload ATCO would be the responsibility of the watch supervisor.

Balancing workload by airspace reconfiguration

7. Changes to the airspace are by nature long-term decisions. However, an individual ATCO may impose a one-way track system on specific flight levels in order to cope with an exceptional situation such as a control position rapidly increasing in complexity. The ATCO might also stop accepting any more aircraft into his sector from adjacent sectors. The use of holding stacks in TMAs represents a form of temporary reconfiguration of airspace.

Balancing workload by demand management

8. By demand management, we mean the decision to restrict the flow of traffic to keep demand within airspace capacity. There are a number of ways in which NATS is routinely involved in demand management. They can all be considered in the context of strategic planning (mentioned in paragraph 3) since they relate either to a forecast of demand or to the aggregate of filed flight plans. The procedures are outlined in the following paragraphs.

Airport scheduling

9. At certain times of year the demand for take-offs and landings at Heathrow and Gatwick is greater than can be handled by airport control. In the past, this has led to extended delays on the ground and in holding stacks. The solution has been for the Authority to declare a runway capacity at both airports in terms of the acceptable peak rate of take-offs and landings. This will vary depending on, for example, the mix of aircraft, and capacity is therefore measured regularly by the Directorate of Research (DR) (see Chapter 14 on quality of service).

10. Airline operators using the airports attend a scheduling conference to allocate future flight schedules between them in such a way that planned demand does not exceed declared capacity. ATC's main aim thereafter is to ensure maximum utilisation of runways, subject to declared capacity.

European flow control

11. At certain times of year the airspace over Europe, or in the vicinity of certain destination airports, becomes congested and potential demand is greater than available capacity. In this event, the authorities concerned restrict the rate at which aircraft can enter their airspace. Such constraints will cascade from region to region, and eventually adjacent regions will impose a flow rate on aircraft entering from the United Kingdom.

12. This restriction may take several forms, such as a maximum average flow rate in a given period of time, or a requirement to be notified before departure. The constraint may apply to particular flight levels, or to the number of aircraft passing over a given ground position on converging routes, or to aircraft proceeding to particular destinations. It is customary for the authority imposing the flow control to allocate capacity to adjacent regions in proportion to expected demand.

13. In the United Kingdom the departure of aircraft subject to flow restrictions is managed at LATCC in the departure flow regulation section (DFR). The ATCOs have a list of capacity constraints which currently apply to destinations in adjacent regions. About one hour before departure, the operator of any aircraft for which the filed flight plan includes a flow controlled section, will contact LATCC and confirm its intended departure time and ask for a departure time or 'slot' allocation. The ATCO will offer the next departure slot on the list. If this is unacceptable, an earlier time on another route may be offered.

14. The system is continuing to evolve and has improved considerably. The Authority has a research programme to computerise the DFR. This will greatly assist the ATCO when flow rates are changed at short notice and a complete reallocation has to be made. Through ICAO, improvements which have already been achieved include the setting up of an international transit route by which certain North/South traffic can bypass central Europe on a restriction-free route, and preferred overload routes to be used when primary routes are congested. The Authority is a member of the European working party set up to provide a central data base and a procedure for integrated air traffic flow management for Europe.

Flow control in the Daventry sector (Davflow)

15. In the Daventry area between London TMA and Manchester TMA lies the main North/South airway. It takes domestic traffic for the Midlands and London airports, and traffic travelling to and from Scotland, including shuttle services, together with traffic entering or leaving North Atlantic routes. The airspace available in the Daventry area is limited, because of constraints imposed by other airspace users. The result is a very congested airspace in which demand frequently exceeds capacity. The controlled airspace in the area has recently been increased and reconfigured to provide two separate routes, one for north-bound and one for south-bound traffic. This has eased, but not entirely eliminated the congestion.

16. The operational solution is to apply flow control at peak demand times. A limiting hourly flow rate is applied each day by the LATCC supervisor. Under Davflow, Manchester TMA and Scottish TMA are each allocated a flow rate at which they can offer traffic to the Daventry sector. The Northern Ireland TMA is not allocated a flow rate, since traffic is small and an allocation might not be fully used. Instead, traffic is given an 'advise before departure' status. Notwithstanding this procedure, traffic to and from the North Atlantic is unrestricted.

North Atlantic control

17. OACC, at Prestwick, is responsible for the control of traffic flying over the North-Eastern part of the North Atlantic. There are two main difficulties associated with North Atlantic flights. First, much of the flight is outside the coverage of radar surveillance. Secondly, the flights are made, for reasons of economy, at the highest possible flight level, at which height the aircraft may encounter strong head winds or even jet streams¹.

18. For the west-bound flight the aircraft needs to take a track which is a compromise between the great circle route and any adverse wind. The compromise gives the least time/least fuel route.

19. The operational solution to lack of radar cover is to use procedural control. Aircraft are metered into controlled airspace with separations that ensure a safe separation at landfall, even for a mix of aircraft with differing speed and climb performances. The procedure is co-ordinated with Gander, which provides control in the North-Western part of the North Atlantic. Aircraft are monitored by a standard reporting system in which their position is reported at every 10° of longitude. The capacity of the airspace is strongly dependent on track separation distances and hence the accuracy of navigational instruments is essential. In the busiest area of North Atlantic airspace all aircraft must be equipped with inertial navigational equipment with a specified error performance.

20. The solution to the problem posed by the variable wind pattern is for west-bound flights to use a system of fixed tracks. A new North Atlantic track structure is produced each day. OACC assembles two basic sets of information in the preceding 24 hours:

- (a) the meteorological forecast of direction and strength of wind; and
- (b) the number of flights and preferred tracks of all operators flying the North Atlantic.

The preparation of the track structure for the following day is outlined below:

- (a) a least time track is computed with respect to the forecast winds, from the entry point in Scotland to the exit point in North America;

¹ A jet stream is a strong current of air with a speed of about 100 knots or more (although that speed would not necessarily be uniform throughout its length) between 20,000 and 40,000 feet, with the strongest jet stream in the mid-30-40,000 feet band. Its width could be up to 300 or 400 miles, with the strongest current (whose speed could be up to 200 knots) in a much narrower band. Its depth similarly varies between several thousand feet. Jet streams over the North Atlantic can vary from Southerly through Westerly to Northerly, with the strongest between South-Westerly and North-Westerly. A jet stream is therefore, in general, helpful to east-bound flights and something to be avoided by west-bound flights.

- (b) a series of tracks is defined by allowing minimum separation distances, both horizontally and vertically, from the minimum time track and from each other;
- (c) the preferred tracks of the operators are superimposed on the 'ideal track structure'. The number of tracks is condensed in order to provide sufficient capacity for expected demand and allow maximum performance for the operators; and
- (d) the final track structure is published for the coming day's operations to allow operators to prepare their flight programmes.

Because of the prevailing Westerly winds over the North Atlantic, it is possible to choose preferred routes for east-bound flights without the need for the complicated track considerations described above in relation to west-bound flights.

21. Aircraft request entry to the North Atlantic track system about 40 minutes before estimated entry time, whilst in flight. They will ask OACC for their preferred track at a preferred flight level at a given time. Possible conflicts are checked with other aircraft already cleared; if this check is satisfactory, the request is accepted; if not, an alternative will be offered, until an agreement is reached. The appropriate selection of track and flight level is very important to the operator as these form the main determinant of fuel used.

Source: MMC study.

APPENDIX 22
(referred to in paragraph 9.83)

Non-operational computer systems available, in development and on order

1. In this Appendix we list the computer systems which are provided through the Authority's Central Services Branch for non-operational routine production, together with the outstanding development load in terms of projects in development and on the order book.

2. NATS SYSTEMS

Current production	Systems under development	'Order book'
Private circuits system	Equipment spares schedule	Inventory control
Tels engineering requirements	AUS (Airspace utilisation section)—operations room control	
Airborne equipment	PCIS (Private circuit information system) conversion	Frequency register conversion
Stock catalogue	TDA enhancements	TEE costing
Traffic data analyser (TDA)		Pre-flight bulletins
Frequency register		'UK Air Pilot'
System control suite		AIS automation
Inventory lists		
Joint airmiss recording		
Aeronautical information (AIS)		
Airspace utilisation		
Project planning and control		

3. EPL/SAFETY SYSTEMS

Current production	Systems under development	'Order book'
Airport statistics (new version)	Occurrence reporting system (in house)	Pans—ops
Airline statistics (old version)	Airline statistics (new version)	Flight recorder analysis (in-house)
Occurrence reporting system (external)		Avionic equipment approval records
Obstacle clearance (external)		Aircraft register
Collision risk model		Aircraft performance statistics
Flight recorder analysis (external)		Engine statistics
		Flight crew licensing
		Flight manuals
		BCARS (British civil airworthiness requirements)
		Overseas student records
		Economic modelling systems
		Air transport licensing

4. FINANCE/CENTRAL SERVICES/SCIENTIFIC SYSTEMS

Current production	Systems under development	'Order book'
Current ledger	New general ledger	Management accounts
Revenue budgets	New revenue budgets	Budget model
Budget model	Batch scheduling	Sales ledger on-line enquiries
Stock evaluation	CAFS (Contents addressable file store) enquiries	Purchase ledger
Capital expenditure		Invoicing
Fixed assets		Corporate plan enhancements
Sales ledger		Rewrite of capital expenditure
Time analysis		P&PS (Printing and publication services) distribution and sales
		Charge construction models
AWD (Airworthiness Division) surveyors costing		
Corporate planning		
Flow control		
Longitudinal separation		
SPSS (Statistical package for the social sciences) service		
Fortran service		
Prosper star service		

5. PAY, PENSIONS AND PERSONNEL SYSTEMS

Current production	Systems under development	'Order book'
Payroll (weekly, monthly, pensioners)	Payroll (weekly, monthly, pensioners)	Manpower model
Superannuation (contributions)	Personnel records	Payroll model
Sick leave/absence recording	Superannuation—actuarial valuation	Investment accounting
	—members statements	
Manpower records	CAFS enquiries—benefit calculations	

Source: CAA.

APPENDIX 23

(referred to in paragraph 9.103)

Relationship between average cost per flight kilometre and measures associated with ATC efficiency

1. In this Appendix we set out, by way of illustration only, how a possible relationship between the ATC output as seen by the customers and the efficiency of a basic operating unit may be formulated.

2. The customer will be interested in the economic component of ATC for a unit of his operations, such as average cost per flight. However, the Eurocontrol service charge is based on distance flown and aircraft weight; it would therefore be, to some degree, consistent to use the average cost per flight kilometre as a unit cost base.

3. The analysis which follows shows how this unit cost base might be related to the structure of controlled airspace and sector capacity (determined ultimately by the workload on the individual ATC, and his equipment). It should be emphasised that this is for the purpose of demonstrating the possibility of such an analysis; and that a great deal of detailed work on definitions and on the analysis of relevant variables would be needed before it would be suitable for management planning and control.

4. The average cost per flight kilometre can be represented as follows:

A. *Cost per flight kilometre*

$$= \text{cost per 'equivalent sector'}^1 \text{ handling}^2 \\ \times \text{number of handlings per kilometre}$$

For a homogeneous distribution of aircraft tracks, and a constant volume of traffic, the number of handlings will depend on the size and structure of the sector, the traffic density and also on the complexity of the route structure and the orderliness of the relative aircraft tracks. The cost per equivalent sector handling can be analysed further and represented as follows:

B. *Cost per sector handling*

$$= \text{cost per unit time per sector.}$$

$$\times \left\{ \frac{1}{\text{Handlings per sector per unit time}} \right\}$$

The handlings per sector per unit time is a form of productivity measure, which can be related to capacity as follows:

C. *Handlings/sector*

$$= \text{Man/machine capacity} \times \text{Utilisation (a measure of utilisation, in certain cases, can be obtained by taking the ratio of actual size of sector to maximum size of sector).}$$

^{1,2} Explanations of the terms 'equivalent sector' and 'handling' are given in the main text (see paragraphs 9.100 and 9.101).

5. The maximum sector size is that which gives the ATCO a maximum safe workload for the prevailing traffic conditions. The use of a sector size ratio as a measure of utilisation will be strictly true if the assumptions in A above are valid. The relationship as set out is rather too simple, because it implies that capacity is in some way a constant, whereas in practice the system is rather more dynamic, since the orderliness of traffic will not necessarily be constant and may vary from area to area and time to time.

6. Since traffic volume varies from time to time, and there are other limitations which have to be taken into account, such as international boundaries and location of airports, a sector will often be less than the maximum possible size. However, a measure of utilisation would help management design the sector structure to make the most efficient use of available resources. There are clearly two aspects: at the strategic level, concerned with the review of sector structure to accommodate long-term trends in traffic volume; and at the tactical level, which is more concerned with operational management in the band-boxing and division of sectors to follow short-term changes in demand.

7. The capacity of the man/machine system in terms of the number of aircraft simultaneously under control depends on the workload complexity per flight. The complexity factor can be allowed for by using the R/T load concept, as recently suggested by DR. The capacity will be related to R/T load as follows:

D. *Capacity is inversely proportional to*

$$\left\{ \begin{array}{l} \text{R/T load per overflight per unit distance flown} \\ \times \text{Proportion of overflights} \end{array} \right\} + \left\{ \begin{array}{l} \text{R/T load per in/outbound flight per unit distance flown} \\ \times \text{Proportion of in/outbound flights} \end{array} \right\}$$

DR has found that on the basis of R/T load, inbound and outbound flights are about 1.75 times greater in workload than overflights.

8. Such an analysis helps to highlight the operational measures and system parameters which are important in providing management with relevant information for the planning of improvements to efficiency, and for cost reduction and control. The analysis outlined above suggests that the following measures may be useful in this context:

- (a) Handling per equivalent sector
- (b) Cost per equivalent sector
- (c) Equivalent sector capacity
- (d) Equivalent sector utilisation
- (e) Average handlings per flight
- (f) R/T load per flight.

Source: MMC study, and CAA.

APPENDIX 24
(referred to in paragraph 10.2)

CAA staff in NATS by location, May 1983

A. AIR TRAFFIC CONTROL CENTRES

London	1,066
Scottish/Oceanic	521
Manchester	183*
JATCRU [†]	49
	<hr/>
Sub-total	1,819

B. BAA AIRPORTS

Heathrow	416
Gatwick	198
Glasgow	112
Prestwick	97
Stansted	89
Aberdeen	87
Edinburgh	81
	<hr/>
Sub-total	1,080

C. MUNICIPAL AIRPORTS

Belfast	101
Manchester	98*
Birmingham	95
Cardiff	67
	<hr/>
Sub-total	361

D. AUTHORITY HIGHLANDS AND ISLANDS AIRPORTS

Sumburgh	66
Inverness	36
Kirkwall	20
Wick	18
Stornoway	15
Benbecula	11
Islay (Port Ellen)	8
Tiree	8
	<hr/>
Sub-total	182

*MMC estimate from information provided by the Authority.

[†]Joint [CAA/RAF] air traffic control radar units.

E. OTHER AUTHORITY UNITS

Headquarters staff	620		
Tels field units	545*		
Trainees etc on HQ books	447†		
TEE	302		
ATCEU	171		
College of ATC	88		
College of TE	83		
	<hr/>		
Sub-total	2,256		
	<hr/>		
Grand total	5,698	of which:	
		ATC centres	1,819 (31.9%)
		Airports	1,623 (28.5%)
		Others	2,256 (39.6%)

Source: MMC from CAA information.

*Excluding Tels staff co-located with ATC centres and airports.

†Cadets at Authority colleges, validation pool and staff loaned to MOD and HM Coastguard Service.

APPENDIX 25
(referred to in paragraph 10.12)

CAA trade unions

1. The following 12 unions were party to the original CAA procedural agreement of 1 April 1972 and the amended version of 7 November 1975:

Association of Government Supervisors and Radio Officers
Civil and Public Services Association
Civil Service Union
Institution of Professional Civil Servants
Society of Civil Servants
Amalgamated Society of Boilermakers, Shipwrights, Blacksmiths and Structural Workers
Union of Construction, Allied Trades and Technicians
Amalgamated Union of Engineering Workers
Electrical, Electronic and Telecommunications & Plumbing Union
General and Municipal Workers Union
National Union of Sheet Metal Workers, Coppersmiths, Heating and Domestic Engineers
Transport and General Workers Union.

2. Since 1975 the following changes have been made:

- (a) the Amalgamated Society of Boilermakers, etc, ceased to have any member in the Authority's employment;
- (b) the General and Municipal Workers Union took over the membership of the Boilermakers Society in other industries and changed its title to the General, Municipal, Boilermakers and Allied Trades Union;
- (c) the Society of Civil Servants changed its title to the Society of Civil and Public Servants;
- (d) the Association of Government Supervisors and Radio Officers decided to merge with the Institution of Professional Civil Servants;
- (e) the Society of Civil and Public Servants and the Civil and Public Services Association agreed in principle to work towards a phased merger.

Source: CAA.

APPENDIX 26
(referred to in paragraph 10.16)

CAA staff in NATS: numbers by occupational group

<i>Year ending 31 March</i>	<i>Grade</i>				<i>Support staff</i>	<i>Total</i>
	<i>ATCO</i>	<i>ATCA</i>	<i>ATE</i>	<i>Other Tels</i>		
1977	1,440	994	1,628	738	1,282	6,082
1978	1,420	956	1,605	645	1,286	5,912
1979	1,437	944	1,591	588	1,261	5,821
1980	1,493	986	1,581	566	1,300	5,926
1981	1,559	963	1,558	545	1,227	5,852
1982	1,559	972	1,532	509	1,273	5,845
31 December 1982	1,549	950	1,524	459	1,261	5,743

Source: CAA.

APPENDIX 27
(referred to in paragraph 10.21)

**CAA staff in NATS:
Corporate plan/actuals comparison**

Forecast



Actual

Year ending 31 March

Corporate plan	1978	1979	1980	1981*	1982†	1983	1984	1985	1986	1987	1988
1978		5,782	5,749	5,698	5,650	5,565					
	5,912	5,821	5,926	5,852	5,846	5,699					
1979		5,866	6,050	6,079	6,041	6,053	5,931				
	5,912	5,821	5,926	5,852	5,846	5,699					
1980			5,935	5,900	5,900	5,900	5,900	5,900			
			5,926	5,852	5,846	5,699					
1981				5,856	5,864	5,843	5,812	5,713	5,635		
				5,852	5,846	5,699					
1982					6,040	5,836	5,775	5,674	5,609	5,608	
					5,846	5,699					
1983						5,830	5,806	5,690	5,580	5,480	5,400
						5,699					

*109 NATS staff were transferred out of NATS (to Authority Personnel Services) in October 1980.
164 ATC staff on loan to MOD returned to NATS (from Authority Personnel Services) during 1981-82

Source: CAA.

APPENDIX 28
(referred to in paragraph 10.46)

Rostering criteria

A: ATCOs

1. Rest days

A rest day is defined as a day preceded and followed by a normal night's sleep. 104 rest days per year, equivalent to a five-day week. Wherever possible, rest days should be arranged in pairs, and a complete week of leave should be preceded and followed by a pair of rest days.

2. Conditioned hours

Conditioned hours, usually expressed weekly, are the hours of duty which pay is calculated to cover and are the minimum hours for which attendance is normally required. Conditioned hours are expressed as gross where the hours of attendance include meal breaks, or net, where meal breaks are excluded. All ATC staff will be conditioned to a gross working week of 40 hours.

3. Meal breaks

A meal break is defined as a period during which staff may leave their place of duty in order to have a meal. Meal breaks must be taken save in exceptional circumstances. They should as far as possible be arranged within the normally accepted meal times (eg lunch 11.30 to 14.30, dinner 17.00 to 20.00). When, exceptionally, meal breaks cannot be provided, the equivalent time will be either paid for at plain time rate against a claim from the individual or given as time off in lieu.

4. Fatigue breaks

A fatigue break is defined as a period of time between operational duties during which an ATCO may rest but not necessarily leave the operations room/building. For ATCOs, fatigue breaks will be provided for operational positions deemed continuously busy by DCATO [Director of Civil Air Traffic Operations], after recommendations from unit managers following consultations with the local staff side. The aim of a fatigue break is to ensure that ATCOs manning operational positions which attract fatigue breaks, are given a meal break (where appropriate) or a fatigue break after not more than two hours continuous duty in an operational position. The duration of a fatigue break will be calculated proportionately on the basis of one half hour for each two hours spent at the operational position less two hours. As meal breaks afford relief from fatigue they will be regarded as including fatigue breaks (of 30 minutes duration). Minor variations may be allowed by local management with the approval of DCATO.

5. Period between duties

The minimum period between duties should be 12 hours but may, exceptionally, be ten hours.

6. Length of duties and split shift working

The maximum hours on any shift will not exceed 12 hours. It is not permissible to include in a roster a morning and night shift on the same day.

7. Night duty

The maximum night watch should be 12 hours, but where possible nine hours or less should be adopted. Where watch systems have two consecutive night watches, the night duty should not exceed nine hours.

8. Annual leave

Annual leave will be debited on the basis that a shift duty of up to and including 12 hours duration will count as one day's annual leave, and one half of such a shift duty will count as one half day's leave. For a shift duty of more than 12 hours duration leave will be debited in hours. Leave so taken will be offset against entitlement on the basis of one hour counting as one eighth of a day's leave.

9. Reliefs

Leave and sickness relief. One relief will be added for every four operational staff (ie a factor of 0.25).

10. Career training relief (including medical examinations, familiarisation flights, etc). One relief for every 15 operational staff (ie a factor of 0.06). These reliefs will be regularly reviewed to cover changes in staff, etc.

B: ATCAs

1. Rest days

A rest day is defined as a day preceded and followed by a normal night's sleep. All staff are conditioned to the equivalent of a five-day week providing for an entitlement to 104 rest days each year in addition to annual leave entitlements and public and privilege holidays.

2. Conditioned hours

Conditioned hours usually expressed weekly are the hours of duty which pay is calculated to cover. Conditioned hours are expressed as gross where hours of attendance include meal breaks or net where meal breaks are excluded. All ATC staff are conditioned to a gross working week of 40 hours. The actual hours of work will be determined by negotiation based on the operational requirements, staff numbers and watch rosters.

3. Meal breaks

A meal break is defined as a period during which staff may leave their place of duty in order to have a meal. Meal breaks must be taken save in exceptional circumstances. They should as far as possible be arranged within normally accepted meal times. When, exceptionally, meal breaks cannot be provided the equivalent time will be either paid for at plain time rate against a claim from the individual or given as time off in lieu.

4. Period between duties

The minimum period between duties should be 12 hours but may, exceptionally, be ten hours.

5. Length of duties and split shift working

The maximum hours of any shift will not exceed 12 hours. It is not permissible to include in a roster a morning and night shift on the same day.

6. Night duty

The maximum night watch should be 12 hours but where possible the night duty should not exceed nine hours. Where rosters include two successive night duties the night duty should not exceed nine hours.

7. Annual leave

Annual leave will be debited on the basis that a shift duty of up to and including 12 hours duration will count as one day's annual leave and one half of such a shift duty will count as one half day's leave.

8. Reliefs

Leave and sickness relief. For ATCAs I, one relief will be added for every four operational staff (ie a factor of 0.25). For ATCAs II, one relief for every five operational staff (ie a factor of 0.20). Career training relief (including medical examinations, familiarisation flights, etc). For ATCAs I, one relief for every 25 operational staff (ie a factor of 0.04). For ATCAs II, career training and further education will be taken into account depending on the individual requirements of each unit. These reliefs will be regularly reviewed to cover changes in staff, etc. In particular note will be taken of ATCAs with heavy trade union responsibilities and appropriate allowance made when calculating the actual staff level at the unit(s) concerned.

9. These criteria will not apply to Highlands and Islands airfields.

C: Tels staff

The aim when producing rosters should be to establish a regular pattern of working which does not concentrate duties into a few days as a result of long shifts. Medical recommendations and social considerations should also be taken into account and should be reflected in future engineering and maintenance policy. Rosters should continue to be negotiated locally using the following criteria:

1. There should be a minimum of 104 rostered rest days per year. A rest day is defined as 'a day on which no duties are rostered or carried out, preceded and followed by a night free of duty'.
2. Rest days should be arranged in pairs whenever possible.
3. The period between rest days should not exceed six calendar days.

4. Day shifts should approximate to eight hours.
5. Night shifts should not exceed 12 hours.
6. The interval between consecutive shifts should be in excess of eight hours.
7. On-call and similar systems, based on current commercial practices, may need to be examined.
8. For the purposes of comparison rosters should be published and expressed in net hours and current practices in respect of meal breaks should continue.
9. It is recognised that it is not possible to roster watch lists to allow shift workers to celebrate public and privilege holidays on the designated days. Days off in lieu should be taken at a later date or payment at enhanced rates should be made, at the officer's discretion.
10. The Group recommends that the intention of leave should be adhered to, which is seen as providing periods of reasonable duration away from work, equating to spring, summer and winter holidays.
11. On the subject of debiting annual leave the Group recommends that this be resolved as a matter of some urgency.
12. In view of the medical evidence contained in Appendix 7 [not published in this report] with respect to working conditions due recognition should be given to ensure standard application for all groups, so that no group is less favoured than any other comparable group.

Sources: Sections A and B: collective agreement on shiftworking practices: October 1976.
Section C: ATE Watch Roster Study Group Advisory Report: December 1977.

Note: All references in this report to hours are net.

APPENDIX 29
(referred to in paragraph 10.60)

**Remuneration: CAA; local authorities;
International Aeradio PLC**

CAA pay: the civil service link

1. The pay scales for the Authority's staff differ from those of their civil service counterparts only by a 6.5 per cent enhancement for superannuation. Civil servants are required to contribute 1.5 per cent of salary towards the widows' pension arrangements of the Principal Civil Service Pension Scheme. The terms and conditions of employment contracts for Authority staff drawn up in 1974 included provision for compulsory membership of the CAA Superannuation Scheme with the rate of contribution set at 7.5 per cent of salary. Civil service rates of pay which formed part of the contract package were accordingly enhanced by 6.5 per cent to take account of the contributions. This rate of enhancement is proved as follows:

Civil service salary = 100	
Less WPS contribution at 1.5%	= 98.5

Authority salary = 100	
plus 6.5% enhancement = 106.5	
Therefore 106.5 - (106.5 × 7.5%)	= 98.5

2. Pay scales for the following are notified direct from the Treasury. The addition of 6.5 per cent at each point of a scale produces the Authority's scale:

- *Accountant class
- *Administration group
 - Catering grades
 - Data processing group
- *Economist group
- Information Officer group
- Legal category
- *Librarian class
- Messenger and Paper Keeper grades
- Office Keeper grades
- Photographer class
- Photoprinting grades
- Professional and Technology category
- Secretarial category
- Science group
- Specialist Teleprinter Operator grades
- *Statistician group
- Store Supervisory grade D
- Tracer and Drawing Office Assistant grades
- Telephonists
- Typists

*These groups share common pay scales.

3. Pay scales for the following are derived by interpolation from the civil service scales announced for their pay link (to which 6.5 per cent should first be added) as shown.

(i)	<i>ATCO class</i>	<i>Civil service pay link</i>	
	SATCO (Senior ATCO)	Minimum of Senior Principal scale	
	ATCO I	Principal scale	
	ATCO II	Executive Officer (EO) main scale, Higher Executive Officer (HEO) scale, Senior Executive Officer (SEO) scale (less top 2 points) and lower points on Principal scale	
	ATCO IV*	EO main scale	
	ATCO Cadet	EO scale	
(ii)	<i>ATCA class</i>		
	ATCA I	Maximum set at 90 per cent of HEO maximum, remaining points set in relation to that maximum	
	ATCA II	Maximum set at 85 per cent of EO maximum, remaining points set in relation to that maximum	
(iii)	<i>ATE class</i>		
	PATE (Principal ATE)	PTO	Scales revised according to percentage movements at maximi and minimi of parent grades
	SATE (Senior ATE)	PTO I	
	ATE	TTO I/II	
	ATE II	TTO III	
(iv)	<i>Communications Officer class</i>		
	CACO I	Senior Station Radio Officer	} GCHQ } Cheltenham
	CACO II/III	Higher Station Radio Officer	
(v)	<i>FE/FOI (Flight Examiner/Flight Ops Inspector) class</i>		
	FE/FOI I	Senior Principal scale	
	FE/FOI II	Principal scale	
	Flight Navigator	SEO scale	
(vi)	<i>Investigation Officer class</i>		
	Chief IO	Principal scale (third point)	
	Deputy Chief IO	SEO scale (third point)	
	IO	HEO scale	
(vii)	<i>Operations Officer class</i>		
	OO I	Principal scale	
	OO II	HEO and SEO scales	
(viii)	<i>CFTAs†</i>	Rates increased by the average percentage increases given to grades at similar salary levels	
(ix)	<i>Grades A—C‡</i>		
	Grade A	Under-Secretary rate enhanced by 6.5 per cent.	
	Grade A1	Executive Directing (middle band) rate, enhanced by 6.5 per cent	
	Grade B	The minimum and maximum move at the same percentage rates as the minimum and maximum of the scale for Assistant Secretary, enhanced by 6.5 per cent. Intermediate points derived by interpolation.	

*A title retained despite the merger of the former ATCO III with the ATCO II grade.

†Craftsmen, firemen and technical assistants.

‡Senior Authority management.

Grade B1
Grade C

By interpolation from the scale for Grade B. Minimum and maximum move at the same percentage rates as the minimum and maximum of Senior Principal, enhanced by 6.5 per cent. Intermediate points are derived by interpolation

(x) *Fire Service Officers*

Pay is linked with that of Fire Officers in the Ministry of Defence via Local Authorities Fire Services.

4. Examples of Authority basic salary scales 1983-84 (1982-83 salaries in brackets)

<i>Grade</i>	<i>Salary (£ pa)</i>	<i>Typical job holders</i>
A	28,489 (from 1.8.83) 29,554 (from 1.1.84) (26,563)	} Senior Authority management
B	20,492 to 24,802 (19,727 to 23,776)	
B1	23,810 (22,823)	
C	18,279 to 23,202 (17,589 to 22,238)	
SATCO	17,614 (16,865)	Officer in charge of large ATC unit
ATCO I	17,019 (16,293)	Watch supervisor at large ATC unit
ATCO II	8,573 to 15,652 (8,268 to 14,978)	Operational controller
ATCO IV	6,442 to 8,112 (6,175 to 7,687)	Operational controller (partially validated)
ATCA I	7,629 to 9,802 (7,299 to 9,353)	Operational assistant, with increased responsibilities
ATCA II	5,623 to 7,324 (5,631 to 6,971)	Operational assistant (20 or over)
PATE	14,070 to 16,732 (13,522 to 16,017)	Officer in charge of large Tels unit
SATE	11,078 to 12,954 (10,631 to 12,384)	Officer in charge of smaller Tels unit
ATE I	8,967 to 11,512 (8,592 to 10,998)	} Operational engineers
ATE II	5,842 to 9,140 (5,572 to 8,717)	

Main additions to basic salary 1982-83

5. *Shift disturbance allowance (SDA)*

SATCO	} 9.5 per cent of basic salary	
ATCO I		
ATCO II on upper seven points of scale:		14.2 per cent

Other ATCO II, ATCO IV	17.6 per cent
ATCA I	14 per cent
ATCA II	16 per cent

All the above are paid to the whole grade, whether or not they work shifts, but subject to an upper limit equivalent to the SDA on a basic salary of £11,512 (1983). This is the top of the ATE I scale, hence the SDAs for PATE and SATE (see below) are percentages of this salary level also. (This is a specific Authority arrangement different from that in the civil service.)

PATE	6 per cent
SATE	8 per cent
ATE I	10 per cent
ATE II	15 per cent

or 10 per cent, 15 per cent, 20 per cent depending on the proportion of night shifts in the individual's roster for those, other than ATCOs and ATEs, required to work shifts. Where salaries at ATCO II and above exceed £11,512 (£10,998 in 1982-83) SDA percentages are calculated as if salary were at that level.

6. Payments for weekend working

For all Authority staff (except Communications Officers) Saturday attendance is paid at time and a half and Sunday attendance at double time or plain time plus time off in lieu. It is not necessary for an individual to have worked in excess of normal conditioned hours over the week as a whole to attract these payments. In addition, a long hours gratuity may be payable up to a salary level equivalent to the top of the SEO scale (£12,747 in 1982-83), in respect of hours worked over and above conditioned hours Monday to Saturday, with Saturday hours counting at time and a half. Where, as is common with shiftworking staff, the roster in use does not permit full conditioned hours to be worked, the shortfall is regarded for pay purposes as notional attendance. Thus long hours gratuity becomes payable for Sunday attendances. The rate of gratuity is 6 per cent of salary for the first three excess hours per week plus 2 per cent for each additional hour, all averaged out over six week periods. The Authority estimates that the combination of these payments may add about 20 per cent to average basic salary earnings for the ATCO II grade and about 33 per cent for the ATCO II grade at a unit like LATCC.

7. On-call allowance

On week-days between the closing of an office in the evening and its opening the following morning (for each period or more than 12 hours)

£3.99

On Saturdays, Sundays and privilege holidays:

(a) For each full 24 hours period

£11.45

(b) For a period of less than 24 hours

£11.45

On public and bank holidays:

(a) For each full 24 hour period

£14.38

(b) For a period of less than 24 hours

£14.38

Actual call-out is rewarded at overtime rates (time and a half or double time).

8. Overtime

Salary ceiling for payment at time and a half (double time after 18 hours' overtime)	£8,388
Salary ceiling for payment at plain time rate	£10,998

9. London Weighting

The London Weighting Allowance, currently £1,331 (Inner) and £553 (Outer) for staff on annual salaries, reckons as pay for all purposes although reckonability for overtime, long hours gratuity, SDA, etc, is subject to a ceiling of £243 (Inner) and £117 (Outer).

10. Additional element of salary

Certain staff who were on secondment for the civil service or were members of the Air Registration Board on 31 March 1972 are paid an additional element amounting to £402 per annum which reckons as salary for all purposes.

11. Luncheon vouchers (LVs)

Except where canteen facilities are provided, staff below Grade B are issued with LVs at the rate of 20 55p vouchers per calendar month. Grades B and above receive the same number with a face value of 15p.

12. Home to duty mileage allowance

Staff who use their own cars for travel to and from duty at operational units which provide air traffic services on a daily basis for 12 hours or more receive a mileage allowance as follows (up to a limit of 30 miles each way):

Cars	—	4p per mile
Motor cycles	—	1.3p per mile

13. Assistance with private flying costs

An ATCO who wishes to fly in order to preserve the validity of his (or her) private pilot's licence and for air experience, is reimbursed by the Authority to the extent of £23 and hour for flying costs, for a maximum of 12 hours (£4 an hour for simulator training, for a maximum of two hours). This scheme is operated in periods of 12 months for 1 April to 31 March. Similar schemes exist for other Authority staff whom the Authority considers would benefit from air experience related to their work.

14. Miscellaneous

In addition to the various payments described above, Authority staff may, in appropriate circumstances, be eligible for the following:

- Allowances paid to staff working in the Shetlands
- Northern Ireland allowance
- Permanent transfer allowance.

Source: CAA.

15. Salary comparisons

A. Local authority airports using their own staff for ATC

Basic salaries 1982-83

SATCO	£11,184 to £12,486 or £12,174 to £13,413	Depending on complexity of airport: the lower scale applies where there is no watch supervisor
Watch supervisor	£11,184 to £12,486	
ATCOs A	£7,545 to £8,658	Officers having a licence with valid aerodrome control rating
B	£8,658 to £9,504	Officers having a licence with valid aerodrome control rating, and valid approach control rating
C	£9,789 to £11,550	Officers having a licence with valid aerodrome control rating, valid approach control rating and valid approach radar rating

There are no national scales for ATCAs and ATEs. Each airport has its own scales determined by local circumstances. Broadly speaking, most ATCAs are paid between £4,000 and £5,000 per annum and most ATEs are paid between £7,000 and £10,000 per annum depending on their level of responsibility.

Shift allowances

Alternating shifts (two shifts on a rota basis not including a night shift over four, five or six days a week):

Where the total period covered by the two shifts is between 11 and 14 hours.	12.5 per cent of salary
Where the total period covered by the two shifts is more than 14 hours.	14 per cent of salary

Rotating shifts:

Three shifts on a rota basis including a night shift over five or six days a week.	17 per cent of salary
Three shifts on a rota basis including night shift over seven days a week.	20 per cent of salary

Plus various premia for weekend, public holiday working and for night and irregular hours worked by those other than shift-workers: standard hours = 37/week net of meal breaks.

Source: National Joint Council for Local Authorities.

B. International Aeradio PLC

		London	Provincial	
ATCOs	I	£11,624 to £13,824	£11,014 to £13,214	} Grading depends on level of responsibilities
	II	£10,420 to £12,773	£9,810 to £12,163	
	III	£9,562 to £11,449	£8,952 to £10,839	
		Plus Inner London Allowance £880 where appropriate		
Shift Pay	Double day shifts Monday to Friday			16 per cent
	Double day shifts 7 days/week			19 per cent
	24 hour cover/7 days a week			26 per cent

Public holiday and overtime working is rewarded by time off in lieu.

		<i>London</i>	<i>Provincial</i>
ATCAs	1	£4,752 to £5,586	£4,142 to £4,976
and	2	£5,047 to £6,047	£4,437 to £5,436
Engineers	3	£5,491 to £6,648	£4,881 to £6,038
	4	£6,081 to £7,412	£5,471 to £6,802
	5	£6,674 to £8,531	£6,064 to £7,921
	6	£7,413 to £10,050	£6,803 to £9,439
	7	£8,745 to £11,868	£8,135 to £11,258

Plus Inner London Allowance and shift pay as for ATCOs (where appropriate). ATCAs are grades 2-4, depending on seniority: engineers are grades 6 or 7.

Additional hours paid at overtime rate ($1\frac{1}{2}$ or 2) except that some engineers get time off in lieu.

Public holiday working by engineers attracts premium payment plus day off in lieu.

Standard hours = 37/week net of meal breaks

Source: International Aeradio PLC.

APPENDIX 30
(referred to in paragraph 12.21)

Aspects of maintenance policy in NATS

There are a number of fundamental factors which affect maintenance policy for the services provided. These are:

The safety of all aircraft using the services.

The safety of all CAA personnel and the public at, or in the vicinity of, NATS stations and installations.

Compliance with international standards and plans.

The continuity of the service so that all services operate with minimum interruption.

Contingency arrangements for operation when the service is interrupted.

The integrity of the service to ensure maximum reliability under all conditions during the life of its supporting equipment.

Determination of acceptable standards with users of the service and the most cost-effective means of meeting the standards.

The cost of the service to its customers.

The effects of changing technology and the full utilisation of its benefits.

The measurement and quality control of facility and equipment performance and the provision of data for any investigation.

The smooth introduction of new facilities and equipment into service.

The technical support required to maintain new equipment.

The planning of maintenance services so that best use is made of resources.

The requirements of new systems and equipment based on field experience and future needs.

Source: NATS.

APPENDIX 31
(referred to in paragraph 12.26)

Reliability of some typical NATS equipment

	Refer- ence No.	Approx age (years)	MTBF (hours)	Accept- able MTBF*	Notes
<i>VHF transmitters</i>	1215	10-12	2,912	—	Power amplifier valves
	1216	2-3	24,196	—	All solid state, current replacement equipment
<i>VHF receivers</i>	1613	12-15	14,542	—	
	1621	2-3	14,458	—	Current replacement equipment (25 KHz channel spacing).
	2107	7-8	35,620	—	
	2001	1-2	34,157	—	
<i>Instrument landing systems</i>					
Localiser—	3003	10-14	1,117	4,000	} Replacement about to be selected.
Glide path—	3015	10-14	1,094	4,000	
<i>Automatic direction finders (VHF)</i>	3101	20+	619	4,000	Replacement programme has just commenced.
<i>VHF Omni-range</i>	3206	15-20	316	4,000	} Replacement programme about to commence.
<i>Doppler VOR</i>	}	3207	9-10		
		3209	6-9	647	
<i>Distance measuring equipment</i>	3303	10-15	495	see 3305	
	3305	0-5	1,186	—	Current replacement equipment for 3303.
<i>Non-directional beacons</i>	3402	25+	1,901	—	3402 currently being replaced by 3404
	3404	1-6	2,780	—	
<i>10cm primary radar</i>	4010	12-15	265	1,100	About to be replaced
<i>Secondary radar interrogator</i>	4110	15-17	425	1,700	} Current replacement not yet operational.
	4112	6-10	682	1,700	
<i>Instrumented runway visual range (IRVR)</i>	5013	}	10-14	293	4,000
	5014				
<i>Flight data entry position (FDEP)</i>	5251	9	216	3,000	
<i>Speech recorder</i>	2504	9-10	1,497	—	
<i>Radar link</i>	2609	8-9	6,778	—	

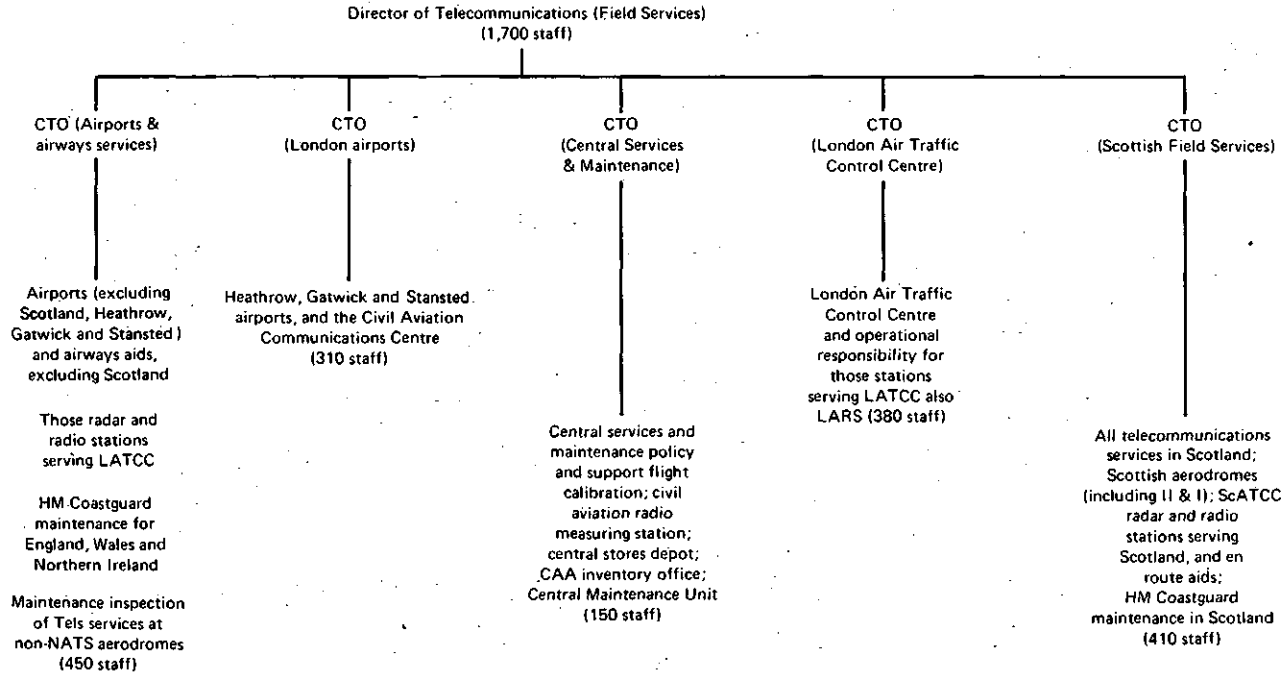
Source: NATS.

*That is, an MTBF acceptable to the Authority, but see Note 1.

- Notes:
1. Where an acceptable MTBF or replacement equipment is not shown, the figure for the equipment given in the third column is regarded by the Authority as acceptable, and representative of the present state of technology.
 2. The examples of equipment listed above, which were selected for us by NATS, include approximately 90 per cent of existing en route navigational aids, 60 per cent of radar head equipment (not including en route radar), 75 per cent of airport navigational aids and 40 per cent of airport communications equipment. Although the sample is weighted in favour of the less reliable items, it is representative of approximately half the equipment used by NATS.

APPENDIX 32
 (referred to in paragraph 12.30)

Organisation of Directorate of Telecommunications (Field Services)



All staff figures are approximate

Source: NATS.

APPENDIX 33
(referred to in paragraph 12.38)

Automatic remote monitoring and control of NATS equipment

1. A trial system has been installed at ScATTC and experience gained in operation of this system has been used to specify the next generation of the remote control and monitoring system (RCMS) currently being installed at LATCC. Features of RCMS are:

- (a) the system has the capability of handling six long range radar stations, initially with provision for expansion to cover the new radar stations projected under the London and South-East radar plan;
- (b) data are displayed on colour visual display units which provide a large number of presentation possibilities. Different presentations are produced by software and selection is accomplished by means of a keyboard;
- (c) for existing radar stations, the number of locations monitored is limited to the number necessary to achieve satisfactory monitoring, control and site security. Control is applied to system reconfiguration (change-over to standby equipment) with some optimisation to meet various weather and propagation conditions; and
- (d) a memory facility is included which will enable the system controller to call up the data stored on disc, either on request or automatically at predetermined times.

2. This installation will enable night manning to be eliminated at existing remote radar stations. For the new radar stations a much more comprehensive system is being installed which aims to achieve unattended operation. This system will enable all electronic preventive maintenance to be carried out remotely from LATCC (without interruption to service) and also includes diagnostic capabilities to enable faults to be automatically located to within one or two modules.

3. A new System Control Office (SCO) has recently been installed at LATCC so that all maintenance operations can be controlled from this office. Apart from systems which are monitored by RCMS, improved control and monitoring systems for communications, navigational aids and data processing are also being installed. These are aimed at making the most effective use of the LATCC Tels workforce and improving liaison with ATC.

4. In view of current developments to extend and improve radar cover in Scotland, plans are being prepared to replace the existing trial system by a system almost identical to that at LATCC and the radar stations which provide it with data. The central control will be provided in the SCO at ScATCC and installation there and at the outstations is expected to be completed in about two years' time.

5. Initial planning has also commenced to install a suitable monitoring and control system at Gatwick which will be the forerunner of a system eventually to be installed at other airports. Apart from improving monitoring and control arrangements at an airport, this system will enable control to be transferred to a SCO elsewhere, so that selected airports may be left unmanned by Tels staff, initially at night. These systems will be installed in parallel with replacement programmes for radar and navigational aids of improved reliability.

Source: NATS.

APPENDIX 34
(referred to in paragraph 12.39)

Central Maintenance Unit (CMU)

In order to cater for the change in maintenance strategy a new CMU has been established, situated alongside TEE at Gatwick and sharing some of its facilities. Maintenance functions which had been provided by TEE have now been transferred to the new unit, together with appropriate staff. CMU has been equipped with a range of specialist test equipment, including comprehensive automatic testing equipment for fault diagnosis on digital printed circuit boards. Other technical support facilities being provided are single items of equipment representative of those in common use in the field. Use of these will be shared with TEE, who will use them for development, but their main maintenance role is to provide facilities for the final checking of equipment modules and diagnosis of those faults which cannot be identified by other means. The CMU is also being equipped with comprehensive repair facilities capable of dealing with a wide range of equipment modules. It has taken over existing responsibilities as the major repair authority and for technical aid on site, formerly exercised by TEE, as well as being responsible for aeriels and associated electro-mechanical maintenance. Equipment which cannot be repaired using the resources of CMU will be returned to manufacturers for attention.

Source: NATS.