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Final Report

Verification of the Capacity of Malpensa Airport

European Commission
Directorate General Energy and Transport
Directorate F: Air Transport

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The purpose of this study is twofold. First, to assess the capacity of Malpensa airport taking into account the impact of environmental measures introduced by the Italian Government Environmental Decree of 13th December 1999. Second, to assess the impact of projected traffic growth in the Milan airport system.

The Final Report is set out in a number of Sections including a review of documentation, impact of environmental measures, surface access, airport infrastructure capacity issues, runway and taxiway capacity, forecasting and hub operations. The traffic forecasts undertaken during the course of the Study indicate that passenger numbers are expected to reach 24.6 million at Malpensa and 7.6 million at Linate in 2003.

The study concluded that, ignoring the effects of the environmental measures, the sustainable runway capacity at Malpensa was no more than 70 movements per hour and that probably only 65 movements per hour are sustainable over a period of three hours.

As for the application of the environmental measures at Malpensa, those measures related to aircraft performance (ban on Chapter 2 aircraft, reduced power on take-off) have no effect on runway capacity. The ban on reverse thrust could have a significant impact on runway capacity when Runway 35L is being used as the main arrival runway. Other measures, for example the ban on night operations, could increase runway congestion during the first operational hour of the day.

In practice, some of the environmental measures, outlined in the Environmental (D'Alema) Decree of 13th December 1999, have not been imposed or are being ignored. *Malpensa is still open for flights during the night. The application of reduced power on take-off is not being enforced.* However, the ban on Chapter 2 aircraft *has been enforced* as has the use of reverse thrust, although *there are a number of exceptions to the ban on the latter*. The runway system is being operated on an alternate arrival / departure basis for each runway *albeit with two 'windows', and other 'allowable' exceptional circumstances, in which runway operation reverts back to operational efficiency mode from noise abatement mode.*

It should be noted that the present way in which the runway system at Malpensa is being operated is considered by the Consultants, in terms of modern practice, to be confusing and with associated safety implications.

The Consultants have been informed by ENAV (and others) that Milan ACC capacity was likely to increase from 83 to 95 movements per hour within the foreseeable future. In addition, there is spare runway capacity at Linate although the airport terminal at Linate has capacity constraints. If, as it is believed, the runway capacity at Malpensa is incapable of being increased significantly above 70 movements per hour then future peak hour traffic growth in the Milan airport system will have to be concentrated at Linate. *To achieve this will require the upgrading and expansion of terminal and car park facilities at Linate airport together with a reappraisal of the current traffic distribution rules.*

2 Introduction and Scope

2.1 Introduction

On 16 September 1998, the Commission adopted a decision declaring the Italian traffic distribution rules (the 'Burlando Decree') for the airport system of Milan (Linate, Malpensa and Orio al Serio) to be incompatible with Community Law.

In order to comply with the Commission decision, the Italian authorities adopted a transitional regime whereby Community air carriers operating at Linate could keep up to 34% of their 1998 frequencies at that airport with the remaining 66% being operated from Malpensa. The transitional regime resulted in approximately 20 movements per hour at Linate whereas Malpensa is operating at 58 / 60 movements per hour.

The Burlando Decree was scheduled to apply as from 15th January 2000. However, on 13th December 1999, Italy adopted a decree providing for the implementation of various measures aimed at reducing the environmental impact of Malpensa. This raises doubts for the possibility of traffic growth at Malpensa in the future. Therefore the Commission requested Italy not to proceed with the application of the Burlando Decree until the impact of the environmental measures on the operational capacity of Malpensa could be analysed. On the 14th December 1999, Italy decided to suspend the application of the Burlando Decree and continue with the application of the transitional regime.

On the 3rd March Italy adopted new traffic distribution rules that were implemented on the 20th April 2000. These rules allow any Community air carrier to operate a certain number of frequencies at Linate for each destination falling within specific traffic thresholds. These rules are opposed by those carriers that have been able to maintain services at Linate on the basis of the transitional regime and which will have to transfer part of those services to Malpensa as a result of the new traffic distribution rules. The carriers consider that the environmental measure will constrain the capacity of Malpensa and not allow the carriers to increase service frequency from that airport.

In March 2000 the carriers lodged complaints to the Commission against the new traffic distribution rules. The impact of the environmental measures on the capacity of Malpensa will be a key element in the Commission assessment of the complaints. Therefore, the Commission needs an in-depth assessment of the capacity of Malpensa taking into account the impact of the environmental measures. This assessment should allow it to determine whether the new traffic distribution rules adopted by Italy are in conformity with community Law, in particular with the principle of proportionality.

2.2 Scope of Study

The in-depth assessment will concentrate on the two issues; these are outlined below.

a) *Assessment of the capacity of Malpensa airport taking into account the impact of the environmental measures provided by the Italian Decree of 13th December 1999.*

The practical impact of the environmental measures shall be analysed in the light of operational and infra-structural patterns at Malpensa airport. The analysis will focus in particular on the impact of the following environmental measures: reduction of take-off speed at 1000 ft rather than at 1500 ft, non-specialised use of the two runways, a better distribution of take-off routes and restrictions on the use of reverse thrust for landings.

The analysis will include a review of the technical report produced by the complaining air carriers and comments to be submitted in this regard by the Italian authorities.

The analysis will also identify and assess other factors that, in combination with the environmental measures, will impact on the capacity of the airport (for example, ATC constraints, terrain, airport layout and other relevant factors).

A maximum number of hourly and daily movements will be established and a reasoned opinion will be delivered on the extent and nature of any impact identified. Possibilities to mitigate any negative impact identified through a quick adaptation and modification of the environmental measures will also be checked.

b) *Verification of the compatibility of the capacity of Malpensa airport as assessed under (a) above with projected traffic growth.*

The impact of the new traffic distribution rules on traffic at Malpensa shall be assessed, taking into account the situation at Linate and Bergamo airports. The impact shall be measured in hourly and daily aircraft movements, and annual passenger traffic.

The likely evolution of traffic at Malpensa for the next 3 years shall be determined on the basis of air traffic growth scenarios.

3 Report Outline

3.1 Review of Documentation

A considerable volume of documentation has been reviewed during the course of this contract. Section 4 includes a brief review of the most important documents and data that were presented to the Consultants. Particular issues of direct relevance to the study are highlighted and referred to in subsequent Sections.

3.2 Environmental Measures

Section 5 reviews the environmental measures as introduced and as applied to reduce aircraft noise at Malpensa. A summary of the current noise abatement procedures has been abstracted from the NOTAM of 14th March 2000. Section 5 then reviews the environmental measures that are supposed to have been introduced. The initial conclusions are that some of the measures will have little impact on runway capacity but others, including reverse thrust and runway switching, will be examined in more detail in Section 8.

3.3 Surface Access

in view of the constraints that surface access often have on the development of airports, a brief review has been undertaken of surface transport facilities for both Linate and Malpensa. Section 6 briefly introduces the subject but the bulk of the material can be found in Annex 2. In this Annex, road accessibility, bus and other public transport services for both airports are discussed. This is followed by a discussion on rail accessibility where, at present, only Malpensa is served by a rail service.

3.4 Capacity Issues

Section 7 looks at airport infrastructure capacity issues although the runway and taxiway system at Malpensa is examined in Section 8 and surface access has been previously discussed in Section 6. Airport infrastructure includes terminals, car parking, aircraft parking areas and air traffic control facilities.

3.5 Runway and Taxiway Capacity

Section 8 looks at the issue of runway and taxiway capacity with particular emphasis on the existing runway system at Malpensa. The first part examines and compares the runway system at Malpensa with other similar airports in order to compare the declared runway capacities that are in force. This is followed by empirical calculations using a methodology, developed for the Commission in 1993, to calculate runway capacity. The impacts of the environmental measures on runway capacity are then examined.

3.6 Forecasting

Section 9 examines the growth of passenger traffic and aircraft movements at both Linate and Malpensa for up to the year 2003. There is some initial discussion on methodology followed by development of data for 2000 based on data for the first part of the year supplied to the Consultants. The forecasts for 2001, 2002 and 2003 are included in Annex 3 and represent the Base Case, High and Low forecast. The section concludes by examining the implications of the Base Case forecasts on airport capacity at both Linate and Malpensa.

3.7 Hub Operations

Section 10 discusses hub operations including the characteristics of an effective hub, the consequences of hub operations and the suitability of Malpensa for hub operations.

3.8 Discussions and Conclusions, Recommendations

Section 11 summarises the conclusions that have been developed in earlier Sections of the Report while Section 12 suggests the way forward, at least in the short-term, to match airport capacity with the projected growth in passenger and aircraft movements through the Milan airport system.

The report concludes with Section 13, References and Bibliography. This is followed by three Annexes, the first of which is a synopsis of the meetings held in Milan and Rome, the second is the detailed study on surface access and the third includes more details of the traffic forecasts. A further seven Annexes include details of traffic data submitted to the Consultants during the course of the study.

4 Review of Documentation

4.1 Introduction

A considerable volume of documentation has been reviewed during the course of the study. Some of this is purely background material but much relates to specific studies and reports that have been undertaken during the last twelve months. This section briefly reviews the documentation, some of which will be referred to in later Sections. Certain points of information have been highlighted where particularly relevant to this study.

4.2 *Commission Decision of 16 September 1998 on a procedure relating to the application of council regulation (EEC) No. 2408/92 (Case VII/AMA/11/98 - Italian traffic distribution rules for the airport system of Milan).*

This relates to the initial proposals for traffic distribution rules set out by the Italian Government with the intention of 'encouraging' airlines to move from Linate to Malpensa. At the same time it was acknowledged the right to develop Malpensa into a viable and operational hub. *The Consultants would question the concept of developing a viable hub with only two runways* (refer Section 10).

4.3 *Milan 99 Real-time Simulation, Eurocontrol, dated August 1999*

The aim of this simulation was to examine airspace organisation in the Milan Terminal Area although scenarios were included that varied the traffic flows from Malpensa from 58 up to 70 aircraft movements / hour. At the time of the simulation Linate had a declared capacity of 32 movements / hour (1998) although constrained by a terminal capacity of 10 million passengers / annum. The Consultants consider that the simulation report is not too relevant to this particular study but will have encouraged the process of increasing the capacity of Milan ACC which is one of the constraints to the Milan airport system.

4.4 *Decree from Il Ministro dell'Ambiente, dated 25th November 1999*

Relates to ways and means by which the impact of noise from aircraft operations at Malpensa shall be mitigated, taking into the consideration the views of the local communities. In Italian, not reviewed in detail.

4.5 *Italian Government (D'Alema) Decree, dated 13th December 1999*

A key document, the Decree contained detailed provisions for the operation of Malpensa airport infrastructure that would minimise the environmental impact of air transport operations at that airport. The provisions were divided into four groups, summarised below.

Immediate measures on operating conditions

- minimise the overall area of noise within the 60 dB(A) noise contour;
- minimise the residential population within the noise contours 65 – 75 dB(A);
- guarantee that the 75 dB(A) noise contour remains within the airport boundary;
- reduction in engine take-off thrust to be at 1000 ft (above the airport) rather than 1500 ft;
- restrictions in the use of aircraft APU systems;
- better distribution in use of flight tracks;
- non-designated runway system to spread noise impact; and
- elimination of night flights.

Immediate abatement and control measures

- exclusion of Chapter 2 aircraft;
- minimum use of reverse thrust on landing if not required for safety;
- introduction of an 'apron-control ' system;
- review of flight paths (tracks) and procedures;
- improvement of noise monitoring, tracking procedures and introduction of sanctions;
- establish a Working Group according to Article 5, DM 31 October 1997.

Further abatement and control measures

The Decree provides for the definition and signing of the programme framework agreement referred to in Article 43 of Law 144/98. This article provides for measures to relocate the resident population in areas where noise pollution does not permit housing. The 2000 Financial Law makes it possible to provide State financial cover for the measures. However, an amendment to Article 43 is required to allow environmental abatement measures to be undertaken, such as the soundproofing of private buildings, so as to allow residents in areas surrounding the airport to stay in their homes.

Medium-term measures

A procedural agreement (signed 31st January 2000 between the Ministry of Transport and Shipping, the Ministry of the Environment, the Regions of Lombardy and Piemonte, the Provinces of Varese and Novara, and SEA) is intended to define co-ordinated measures for monitoring and minimising the impact on all aspects of the environment, including air, waterways and the natural environment.

4.6 Malpensa Airport Infrastructure Study, Alan Stratford & Associates, December 1999.

This report reviewed the progress made by the Italian Authorities in implementing specific works and improvements to allow the transfer of airlines from Linate to Malpensa Terminal 1. At the time of submitting the report, the implications of the environmental decree and the effect on runway capacity were uncertain. The report confirmed a previous assessment that the runway capacity at Malpensa to be 70 movements per hour for a limited period and also re-stated the view of IATA that up to 90 movements per hour are achievable. The previous assessment was based on dedicated (single-mode) operations for runways 35L and 35R and that the environmental decree may constrain this level of movement.

The Consultants (Cranfield University) express the view (see later Sections) that, taking into account the present operation of the runway system, a runway capacity of no more than 65 movements / hour is sustainable for a period of three hours. The Consultants also conclude that a sustainable runway capacity of 90 movements / hour is unachievable for the foreseeable future, noting that Heathrow with two single-mode independent runways achieves 80 movements / hour and that both runways operating independently in mixed mode could achieve 90 movements / hour. The runway and taxiway layout at Malpensa precludes this.

4.7 Modalità di esercizio dell'infrastructura aeroportuale della Malpensa: This is a report from the Minister for Transport and Shipping to the Italian Government, dated 25th February 2000.

This document outlines the rationale behind the environmental measures that have been introduced at Malpensa Airport. The document commences with the background to the events that led to the need to find the best solution to the problem of noise pollution from Malpensa airport.

The first part of the document confirms that the representatives of local government accepted a report from the consultants Modula Uno who demonstrated the Integrated Noise Model (INM) to be a reliable means of forecasting noise levels in the vicinity of Malpensa airport (refer Section 4.16).

However, as a result of the INM studies, it was decided that due to the high level of noise it would be necessary to introduce new operational procedures that would minimise the environmental impact and, in general terms, the following measures were considered:

- immediate measures on operating conditions;
- immediate abatement and control measures;
- further abatement and control measures; and
- medium-term measures.

Some of the above measures, and their effects, are examined in Sections 5 and 7.

4.8 Communication from the Minister for Transport and Shipping dated 3rd March 2000.

This sets out the new traffic distribution rules for the Milan airport system, Linate operations, with particular reference to scheduled services on intra-community air routes only. For example:

a) Less than 350,000 passengers / annum: no air service allowed except for a maximum of one frequency per day for routes serving airports located in 'Objective 1' areas.

b) Less than 700,000 passengers / annum but more than (a) limit: a maximum of 1 daily frequency per carrier is allowed.

c) Less than 1,400,000 passengers / annum but more than (b) limit: a maximum of 2 daily frequencies per carrier is allowed.

d) Less than 2,800,000 passengers / annum but more than © limit: a maximum of 3 daily frequencies per carrier is allowed.

e) More than 2,800,000 passengers / annum: no limitations on the number of frequencies offered.

Note that the passengers numbers above refer to the Milan airport system (Malpensa + Linate). In practice, most airlines would consider that a route between a city-pair should have at least two frequencies each weekday or at least match the frequencies operated by a competing carrier(s) in order to retain market share. Airlines also prefer not to split operations for the same city-pair route between two different airports, for example, Heathrow <> Malpensa, Heathrow <> Linate.

4.9 Jeppesen charts submitted by Lufthansa to Simmons & Simmons Grippo on 10th March 2000

This submission included a number of Jeppesen charts together with comments on landings on Runways 17 L/R at night and other conditions of low visibility. Simply, if the wind is from the south then no night / low visibility operations are possible on Runways 17L / R and aircraft have to be diverted to Linate. One of the charts, dated 27th January 2000, specifies that '*the use of reverse thrust is allowed only at idle thrust except for provable safety reasons*'.

4.10 An evaluation of the ATS Operational Capacity at Malpensa Airport submitted by Simmons & Simmons Grippo

This report examines those factors relating to ATC operations at Malpensa airport.

The first part of the report defines the theoretical and operational ATC capacity, both being expressed in terms of aircraft / hour. Theoretical capacity is usually defined from mathematical models based on selected parameters. The operational capacity takes into account other factors that are generally variable, for example, human factors, prevailing climatic conditions and ATC procedures.

Three important points are initially made:

- Runway 35R used to be designated for arrivals and Runway 35L designated for departures before implementation of the Environmental Decree
- There is a lack of high-speed exits on Runway 35L for terminal 1 arrivals (the ban on reverse thrust would any case render multiple high-speed exits superfluous)
- Aircraft have to cross Runway 35L (arrivals) to reach the departure Runway 35R

The second part of the report examines factors that may affect ATC operational capacity. These include:

- physical layout and constraints;
- apron management and ground-based guidance systems;
- ATC procedures;
- traffic mix;
- human factors;
- airspace; and
- terrain and climate.

The second part of the report deals with the impact of environmental factors on ATS operative capacity. Although a number of operational problems were discussed, they were not supported by any numerical analysis.

4.11 Report on Milan Air Traffic Control, Amico (ATC consultants),dated 10th April 2000

A rather brief report addressed to the European Commission but the followed comments should be noted:

- Estimated runway capacity of the Malpensa Runway 35 L / R system is *between 58 and 65 aircraft per hour*, the higher figure being applicable for arrivals on 35R and it is assumed that the lower figure relates to 35L being used for arrivals.
- Estimated runway capacity for Linate is *about 32 movements / hour.*

4.12 Traffic data for European airports, January to April 2000, SEA

The original source for the traffic data (reproduced in Annex 4) is the ACI ~ rapid data Exchange Program. The data shows aircraft movement, passenger and freight data for the top ranking European airports. The Milan airport system (Malpensa / Linate) ranks 9th in terms of aircraft movements with Malpensa showing an 18% increase in aircraft movements over the corresponding period the previous year. In terms of passenger numbers Milan ranks 7th and freight 6th in Europe. The corresponding figures for the Roma airport system are 11th, 6th and 7th respectively.

4.13 Traffic data for Milan airport system, June 1 - 25, 2000, SEA

This is a snapshot of traffic data (reproduced in Annex 5) for the Milan airport system for June 2000. The data includes the total number of movements for scheduled and charter services, scheduled, charter and transit passengers and freight for individual days and the same data averaged over the same period. Following sheets break the data down into the Linate and Malpensa components.

During this period the peak number of daily movements at Malpensa was 825 (5th June) and 201 (23rd June) at Linate. Note that the average number of daily movements at Linate was 176 that, over a 17-hour period, is equivalent to just over 10 aircraft per hour. The equivalent data for Malpensa is 726 and 43 respectively, again over a 17-hour period.

4.14 Origin / destination and other traffic data for Milan airport system, May 2000, SEA

This is a snapshot of traffic data (reproduced in Annex 6) for the Milan airport system during the 12 month period up and including May 2000 and is divided up into a number of sections, as follows:

- Airlines ranked in terms of total air transport movements through the Milan system (Linate + Malpensa), Malpensa and Linate. The dominant airline for the Milan system is Alitalia. Lufthansa is in second place followed closely by Air Europe SPA and Air One. At Linate, Alitalia is the dominant airline followed by Air One. British Airways holds a rather distant third place. At Malpensa Alitalia is again dominant followed by Air Europe SPA (operating a charter hub) and Lufthansa. British Airways and Air France hold rather distant fourth and fifth positions respectively.

- Airlines ranked in terms of passengers as above. Again, Alitalia is dominant followed by Air Europe SPA, Air One, Lufthansa and British Airways. At Linate the order is Alitalia, Air One, British Airways and Lufthansa. At Malpensa the order is Alitalia, Air Europe SPA, Eurofly (charter) and Lufthansa.

- Airlines ranked in terms of cargo as above. Again, for the total system, Alitalia dominates followed distantly by Nippon, Korean and British Airways. British Airways is the lead cargo airline at Linate whereas at Malpensa the dominance of Alitalia is hardly matched by Nippon, Korean and KLM.

- Air transport movement data for May 2000 alone followed the same pattern as the rolling 12 month period as does the passenger and freight data although in this month Alitalia dominated freight operations at Linate.

- Origin / destination aircraft movement data is also shown in a similar format. The leading origin / destination (O/D) for the Milan system is the Roma system followed by the London system, Paris, Napoli and Catania. The leading O/D for Linate is the Roma system followed distantly by the London system and then Frankfurt. Roma is again the leading O/D for Malpensa, closely followed by London, Catania and Naples.

- Origin and destination passenger data follows a similar pattern although at Malpensa the lead O/D is Napoli followed by the London system, Roma and Catania.

- Freight levels at Linate are relatively small compared with Malpensa with only London and Frankfurt having significant freight flows. New York and Chicago dominate freight flows at Malpensa, distantly followed by Amsterdam and Narita.
- Air transport, passenger and freight O/D data for May 2000 alone followed roughly the same pattern as the 12 month period.

4.15 Airport punctuality data for Malpensa (Source: SEA)

This consists of three graphs that are reproduced in Annex 7. These are:

- Airport punctuality (Malpensa) ~ percentage of flights departed on time out of the total departures versus number of delays due to ATC.
- Airport punctuality (Malpensa) ~ percentage of delayed flights out of the total departures versus percentage of delays due to ATC and delays on arrival (= 93) out of the total departures.
- Re-departures time make-up on late arriving flights (Malpensa) ~ percentage difference between the percentage of the delayed flights on arrival and the percentage of the delayed flights on departure.

Note that:

- The percentage of flights departed on time, for the period 20th March to 20th May inclusive is shown as varying between 23% and 80%. During the same period the number of flights delayed by ATC varied between 35 and 128.
- During the period January 2000 to June 2000 the percentage of flights delayed on arrival increased from 30% (January) to 44% (June). During the same period, the percentage of delayed departure flights increased from 23% to 40%. This indicated that some marginal recovery to delays was possible during the turnaround time.

4.16 Studio Acustico dell'Aeroporto Malpensa 2000, Modulo Uno, 2000 (Client: Italian Government)

This is an aircraft noise study undertaken by the above consultants using the INM model to develop noise contours. The model takes into account the effect of terrain and meteorological conditions. A number of scenarios were examined including selected noise abatement procedures, the busy day and alternative runway operational modes. The output data enables the land area and population subjected to specified levels of noise to be calculated.

4.17 Filed demand at Malpensa for 12th June 2000 (Source: SEA)

This is a snapshot of a single day's data (reproduced in Annex 8) showing, on an hourly basis, filed demand for arrivals, departures and total aircraft movements. Peak arrival hours are from 0600 hrs local (longhaul) and 1600 hrs local, the latter having a peak of 50 movements / hour. Peak departures are from 0800 hrs local and 1800 hrs local, the former having a peak of 51 movements / hour. The peak hours for total movements are 0800 hrs local (68 movements) and 1800 hrs local (66 movements). It should be noted that the data presents filed demand (i.e. airline plans) and gives no indication of the actual distribution on the day of arrivals and departures or the delay, if any, that each flight incurred. However, the total filed demand for the 12th June was 846 movements. Cross-referencing to Annex 5, it can be seen that the total number of recorded scheduled and charter movements were 819 on the same day, a shortfall of 27 on the planned demand. This shortfall often occurs because of slot overbooking by airlines, cancelled flights or even airlines going out of business.

4.18 Slot allocation data for Malpensa (various dates) (Source: Assoclearance)

A sample of slot allocation data (reproduced in Annex 9) was received for the summer (2000) and winter (2001) season at Malpensa. *Note that the data in Annex 9 refers only the specific dates specified in the following paragraph and not to any other days / weeks during the 2000 Summer / Winter seasons. The filed demand may well change from one week to another and even from one day to another during the period in question.*

The summer 2000 data covers the dates 11th (Monday) to 17th (Sunday) September inclusive. The morning peak is consistently between 0700 and 0800 hrs local with two of the days having 70 movements / hour in this period, approximately 40% being arrivals and 60% departures. The second peak is consistently between 1700 and 1800 hrs local with a peak of 68 movements / hour. During this period there are slightly more arrivals than departures. With the exception of the Monday Malpensa is planned to operate at 60 or more movements / hour for only three hours each day and at 55 or more movements / hour for six hours a day. The numbers of daily movements vary between 759 and 907. There is some indication that a third (mid-morning) peak may be developing.

The winter 2001 data includes the dates 12th March (Monday) to 18th March inclusive. Compared with the summer slot requirements there seems to be a subtle change in the distribution of aircraft movements with the continuing emergence of a midday peak and the evening peak now starting at 1800 hrs. the airport is planned to operate at 60 movements / hour for at least 4 hours each day and 55 movements / hour for between 6 and 13 hours / day depending on the day of the week. The total number of aircraft movements varies between 810 and 942 movements.

From the sample of data it can be shown that, although Malpensa has a nominal capacity of 70 movements / hour, in practice on the busiest sample days (Monday 11th September and Monday 12th March) planned runway operations only exceed 60 movements / hour for a total of

5 and 8 hours respectively. It is understood that simulation work undertaken by SEA has indicated that over 1000 movements per day may be accommodated by the Malpensa airport infrastructure and, if correct, over a 15 hour operational day this would assume an average throughput in the order of 67 movements / hour. This can be compared with the average throughput for May / June 2000 which averaged out at 734 movements / day.

4.19 European ATC Regulations for 21st June 2000 (Source: ENAV / Eurocontrol FMU)

This data indicated that 169 flights operating to / from Malpensa were subjected to ATC regulations, that is, there was some form of delay attributable to airspace congestion. Further comments are made in Section 4.21.

4.20 Flight delays for 7th / 20th June 2000 (Source: ENAV / Eurocontrol)

This is a selection of data for the above dates showing delays for flights operating to / from Malpensa. Refer to comments made in Section 4.21.

4.21 Average traffic delay at European airports [Malpensa, Fiumicino, Heathrow, Gatwick, Charles de Gaulle, Orly, Madrid, Barcelona, Frankfurt, Munich, Zurich, Brussels and Amsterdam] for the 22nd and 25th June (Source: ENAV / Eurocontrol)

Average traffic delay data was submitted (reproduced in Annex 10) for a number of selected airports for the 22nd and 25th June 2000. Although the interpretation of such data is highly subjective, it is worth noting that the average delays at Malpensa were approximately 18 and 22 minutes per aircraft movement for the respective dates. This compares with 14 and 22 minutes for Fiumicino and 16 and 16 minutes for Heathrow. The magnitude of delay for the other airports is little different.

The main problem with delay data in this format is that there is no differentiation between delay that might be attributable to ATC en-route, airline operations or airport congestion. Nevertheless, Malpensa is no better / worse than a number of other European airports.

4.22 Linate airport ~ Analysis of the infrastructure and operational capacity of the airport, ENAC, 3rd April 2000.

The airport is judged to be capacity constrained in the main terminal building where there is insufficient floor area in the domestic departure area for peak hourly passenger flows. A similar problem exists for international flight departures. Car parking spaces are less than 50% of FAA requirements (3600 spaces for 7 million annual passengers in 1998). This is particularly critical as there is no rail / metro service to the airport and therefore a high dependence on car and taxi transport. Improvements in service quality had been noted between 1998 and 2000, no doubt because of the transfer of flights to Malpensa in 1999. The annual capacity of Linate was set at 82,500 flights / annum. This is equivalent to 225 flights / day or 13 flights / hour over a 17 hour operational day. Assuming an average of about 100 passengers / aircraft then this results in an optimum infrastructure of 8 million passengers per year. *From the above analysis, it must be concluded that if the terminal departure area was increased then a significant increase in peak and annual passenger throughput would be achievable with a corresponding increase in the declared runway capacity.*

Elsewhere in the document it is noted that in 1998 the sustainable capacity at Malpensa was in the order of 58 movements / hour whereas in 2000 this is quoted as being 70 movements / hour. The capacity of Milan ACC is quoted as being 82 / 83 movements / hour which, conveniently, corresponds to the combined declared capacities of Malpensa and Linate.

4.23 Malpensa Airport Operation Information from Aeronautical Information Publication (AIP / Air Pilot) for Italy and associated NOTAMS.

4.23.1 NOTAM 14th March 2000

Implementation of the D'Alema decree at Malpensa (13th December 1999) was by a NOTAM dated 14th March 2000 with the measures becoming effective 26th March 2000 (Sunday). This NOTAM is documented in Section 5.2.

4.23.2 NOTAM 7th April 2000

This NOTAM, on a trail basis, introduced a series of exceptions to the environmental measures introduced in the NOTAM of 14th March 2000. These include:

- Alternate use of the runways: The time and daily alternance in the use of the runways as stated in NOTAM AO947/00 (14th March 2000) will apply to departures only. A tolerance of plus /minus 15 minutes is allowed to the established time for runway change. The alternate use of the runway may not be applied if so required for safety reasons (operational, climatic). *From 0930 to 1130 local time and from 2030 to 2230 local time* ***these two hours windows may be shifted if so required by the peak-traffic forecast****. If necessary, a tolerance of plus/minus 15 minutes is allowed at the beginning and at the end of the windows. By night,* ***from 2130 to 0630 local time****, Runway 35L shall be used for landing.*
- The radial/track departure scheme does not apply to propeller and turbo-propeller aircraft and to BAe146 aircraft.
- When departing from Runway 35L aircraft type MD80 and Airbus 320/321 may be cleared to use SIDS on Radial 280 or, subordinately, on Radial 320, in addition to SIDS on Radial 310.

4.24 Summary

With particular reference to Section 4.23 above, documentation received by the Consultants has also mentioned the existence of a Service Order dated 10th May 2000 (allowing controllers discretion on use of alternate runways at Malpensa) and a NOTAM dated 23rd June 2000 confirming this Service Order. Enquiries have failed to locate these documents.

Nevertheless, it can be concluded that:

- *The impact of the environmental measures is still being reviewed / tested after application of new traffic distribution rules.*
- *There is no ban on night flights*
- *Alternate use of runways not applied during 'windows' of two hours after the traffic peaks and the 'windows' appear to be highly flexible in terms of the operating hours in which they apply.*

5 Environmental Measures

5.1 Introduction

The overall purpose of the environmental measures is to:

- Minimise the overall area of noise (within the noise contour of 60dB(A)).
- Minimise the residential population in the zone within the noise contours 65 - 75dB(A).
- Ensure that the 75dB(A) noise contour remains within the airport boundary.

However, it was acknowledged that a trial operational period would be required to ensure that the above requirements could be met under current traffic levels and that a level of flexibility would be required taking into account the operational requirements of a hub airport having scheduled and recurrent traffic flows.

As the result of further deliberations, the following scenario was adopted:

- Noise levels could be spread more evenly by moving away from the concept of designated runways for arrivals and departures.
- Elimination of night flights by June 2000.
- Exclusion of Chapter 2 aircraft.
- Reduction of take-off thrust at 1000 ft.
- Minimum use of reverse thrust on landing

Additional measures are also to be considered. These include the relocation of the resident population from those areas where noise pollution does not permit housing of the adoption of environmental abatement measures, such as the soundproofing of private buildings, so as to allow residents in areas surrounding the airport to stay in their homes.

5.2 NOTAM of 14th March 2000 for aircraft operations at Malpensa Airport.

In general, environmental measures can be summarised by the NOTAM of 14th March 2000 relating to 'Noise Abatement Procedures'. The NOTAM refers to provision No. 00-940/DG dated 3rd March 2000 of the Civil Aviation Authority, effective date 26th March 2000. The NOTAM indicates that on a trial basis, for a period of at least three months, Milan Malpensa noise abatement and initial climb procedures are modified.

Noise abatement departure profile for all runways (17/35): Take-off power / thrust to be reduced to not less than climb power/thrust at 1000ft above aerodrome elevation.

Alternate use of the runways: The runway use is modified as follows:

First day:

- From 0230 to 1030 local time, Runway 35L for departures, Runway 35R for arrivals
- From 1030 to 1830 local time, Runway 35L for arrivals, Runway 35R for departures
- From 1830 to 0230 local time, Runway 35L for departures, Runway 35R for arrivals

Second day:

- From 0230 to 1030 local time, Runway 35L for arrivals, Runway 35R for departures
- From 1030 to 1830 local time, Runway 35L for departures, Runway 35R for arrivals
- From 1830 to 0230 local time, Runway 35L for arrivals, Runway 35R for departures

Third day as first day, Fourth day as second day etc.

When operational conditions allow, *aircraft will be permitted to land on Runway 35L even when Runway 35R is used for arrivals* [*that is, Runway 35L could be used for mixed-mode operations*].

The above alternate use of the runways may not be applied:

- If so required by safety reasons (operational / meteorological conditions)
- From 0730 to 0930 local time and from 1830 to 2030 local time ('window')

In other words, this appears to be carte blanche to revert back to operating 35L for departures and 35R for arrivals. It is also believed that a third 'window' may be allowed during the middle of the day.

Use of aerodrome by aircraft Chapter 2 Annex 16 ICAO: Aircraft Chapter 2 Annex 16 ICAO can not use Malpensa aerodrome, except for emergency.

5.3 Runway operations

Runway operations at major airports normal follow a set of standard rules taking into account climatic conditions, traffic flows, aircraft type, location of terminals and so on. The two runways at Malpensa have a centre-line to centre-line spacing of approximately 800 metres. Therefore the two runways cannot be operated completely independently as in the case, for example, Heathrow.

This and subsequent discussions on runway capacity are partly based on advice from the FAA Advisory Circular 150/5060-5 (9-83).

Runways 35L and 35R are used, because of the predominant direction of the prevailing wind, for almost 100% of the time. It is acknowledged that the use of Runways 17L and 17R will result in reduced capacity operations or even diversions during periods of low visibility, as there is no ILS equipment available.

The original mode of runway operations was to use runway 35L for departures and Runway 35R for arrivals. This operational mode was perfectly satisfactory when the main airport terminal at the time was Terminal 2, located between the two runways and to the north of Runway 17L and 17R thresholds. The construction of Terminal 1 to the west of Runway 35L requires that aircraft accessing to / from Runway 35R now have to cross an active runway (35L). The use of designated runways for arrivals and departures will also mean that the noise contours will affect specific areas around the airport for the entire operational day of the airport. In the case of Heathrow noise exposure has been mitigated by reversing the operational mode in mid-afternoon, that is, one runway switches from arrivals to departures and vice versa. The two runways at Heathrow are normally used for single-mode operation although there is a dispensation for limited mixed-mode operations for flights to / from Terminal 4 when traffic levels are low.

The introduction of the procedures, outlined in Section 5.2, is an attempt to spread noise exposure. This has meant a reduction in noise exposure for some residential areas but an increase in noise exposure for others. Nevertheless, the overall intention is to minimise the overall noise exposure for those inhabitants living in the vicinity of the airport to below defined levels (Section 5.1). *There can be no criticism of these attempts to try to reduce the environmental impact of the airport* in accordance with the D'Alema Decree.

However, the proposals complicate the operation of the airport runway and taxiway system with consequent implications *for efficiency (and therefore capacity) and safety*. To summarise:

- There is a change in runway designation twice a day for single-mode operations, with a consequent potential for confusion for pilots used to designated runway use at other airports.
- There are at present two 'windows' (and there are proposals for a third) in which the alternate use of runways is not required. As above, there is some potential for confusion for the reasons stated above.
- Arriving aircraft may be allowed (required?) to change the landing runway (side-step procedure) with consequent revision to the missed-approach and reverse-thrust procedures.
- Departing aircraft have to reset flight management systems to take account of the departure routes appropriate for the runway currently used for departures resulting in an increased workload for the flight crew.
- Taxiing operations have to take account of this 'flexible' use of the runway system, again, increasing the chances of confusion especially under low-visibility conditions.
- At present there is no surface movement guidance system although it is proposed to install one in the near future. This must be seen as an absolute necessity in view of the comments above.
- The noise impact of these operational scenarios is still being measured and it would not be surprising if further adjustments are made to the sequencing of runway operations.

In the opinion of the Consultants, the present system is complicated and has *operational safety implications that include changes to arrival and departure tracks and difficulty in planning in advance which taxiing route will be taken from the runway to the aircraft parking area*.

As to whether there is any impact in capacity, the introduction of 'windows' has been designed to deal with the imbalance of arrivals and departures caused by hub operations. It is also noted that an element of flexibility is allowed in the case of adverse weather conditions or for safety reasons. Determination of system capacity is difficult to assess until the environmental impact (noise level) studies have been completed and the mode of runway operation finalised.

Note that runway capacity including the *quantifiable impact of the environmental measures* as properly applied or as actually applied will be examined in Section 8 of this Report.

5.4 Chapter 2 Aircraft and Night Operations

Chapter 2 (and below) aircraft are now banned from using Malpensa airport except in the case of emergency. It is understood that comparatively few aircraft operations were affected by this measure (about twenty flights per day). There is *no impact on runway capacity* while at the same time resulting in a slight reduction in overall noise levels.

Linked to this was a proposal to eliminate night flights between 2300 and 0600 hrs local. The number of scheduled flights affected by this, up to 0500 hrs local, is comparatively few although between 0500 and 0600 hrs there is a significant demand for slots (Section 4.18). It would seem that Alitalia with long-haul early morning arrivals would be most affected together with Charter operations that operate on a 24-hour basis. Again, there is *no theoretical impact on runway capacity*. However, there is a potential knock-on effect in that flights normally scheduled between 0500 and 0600 hrs would be forced to compete for slots with aircraft normally scheduled between 0600 and 0700 hrs (the first operating hour in the morning). In addition, Charter flights would also find it almost impossible to operate a three-rotation per day operating pattern through Malpensa. However, the measure has not yet been implemented.

5.5 Noise Abatement Procedures

Noise abatement procedures require that aircraft take-off power / thrust to be reduced to not less than aircraft climb power / thrust at 1000ft above the aerodrome elevation. The normal transition point is 1500ft. Noise abatement procedures are not popular at any time as this is the most critical stage of the aircraft mission and with the growing number of two-engine aircraft, then the greater the safety margin the better. It is believed that this particular procedure is being ignored by many pilots and, in any case, is difficult to enforce.

The revised noise abatement procedure will *not have a measurable impact on runway capacity*. However, from a safety point of view the revised procedure causes concerns. For example, departing aircraft, already in a critical stage of flight, would have a further reduced safety margin in the event of engine failure while at the same time the aircraft is turning to follow departure routes that have been designed to avoid both terrain and urban areas. In such an event, 500 ft can make all the difference in retaining control of the aircraft and avoiding an accident.

5.6 Reverse Thrust

The use of reverse thrust is 'banned' (*'sua utilizzazione al minimo'*) unless for operational or safety reasons. Idle thrust is allowed and, with other aircraft braking systems, is sufficient to bring an aircraft to a halt well before the end of the runway.

Many airports and airlines, as a means of allowing an aircraft to vacate the runway as quickly as possible, encourage the use of reverse thrust as part of normal landing operations. This allows the runway to be released for other aircraft movements and often minimises the taxiing distance from the runway to the aircraft stand. The use of reverse thrust at a single runway airport is particularly important for maximising runway capacity. As soon as the landing aircraft as vacated the runway, the next departure can be cleared to commence the take-off roll. As an example, this allows London Gatwick to have a declared capacity of 48 movements / hour with a recorded maximum throughput of 55 movements / hour.

If a runway is solely used for arrivals then the time separation between successive aircraft, due to radar / wake vortex separation, allows sufficient time for the preceding aircraft to vacate the runway or, if there is a problem, for the following aircraft to carry out a missed approach. For example, two aircraft with an approach speed of 150 knots and separated by 3 nautical miles (nm) would have a minimum time separation of about 72 seconds. The use of reverse thrust could allow the preceding aircraft to vacate the runway in, say 20 / 25 seconds. If idle-thrust is used and the runway does not have a high-speed turn-off (as with runway 35L towards Terminal 1) then the runway occupancy time increases considerably and consequently the separation between successive aircraft has to be increased correspondingly. If the runway is being used for mixed-mode operations then departing aircraft will be delayed for an additional time until the landing aircraft has vacated the runway.

As stated above the impact on runway capacity will be discussed in Section 8 but, of all the environmental measures that have been discussed, the banning of reverse thrust *is the most likely of the environmental measures to reduce the capacity* of the runway system.

5.7 Summary

Of the environmental measures discussed in this Section, the ban on Chapter 2 aircraft, and noise abatement procedures are unlikely to have any measurable impact on runway capacity.

The Consultants believe that the proposals for the alternate use of runways, for arrivals and departures, have both safety and capacity implications. For example, under certain conditions where Runway 35L is being used for arrivals, there will be a reduction in runway capacity because of the lack of a high-speed turn-off and the ban in the use of reverse thrust.

6 Surface Access

6.1 Introduction

Surface access is one of several infrastructure constraints that are taken into consideration when evaluating the declared capacity of an airport as well as being a factor that encourages, or otherwise, passengers to use a particular airport. In the past, Malpensa was less attractive to airlines, compared with Linate, because of the relative locations of the two airports to the centre of Milan. Indeed, before construction of the rail link and improvements to the highway network, Malpensa was perceived to be a difficult airport to reach by surface transport, a perception that other airports like London Stansted, for example, still face.

A brief review has therefore been undertaken of the surface transport facilities for both Malpensa and Linate. This has been included with the study as Annex 2. This Section will therefore briefly highlight the more salient points.

6.2 Road Access

Access to both Linate and Malpensa is theoretically quite good but subject to peak hour road congestion. Access times to Linate are less as the airport is located nearer to the centre of Milan but, as with other major conurbations with multiple airport systems, convenience is also dependent on the range of flights that individual airports offer.

Malpensa is linked to the A8 motorway by a new road completed in October 1998. Further links and upgrading of existing roads are planned not only to reduce travel times to Milan but also to improve links throughout the Lombardy region. Taxi fares between Malpensa and Milan are a function of road congestion and can vary between €45 and €65.

Linate is linked to the centre of Milan by a ring road that suffers from heavy congestion during peak hours. Taxi fares are considerably lower but, again, can vary with congestion.

6.3 Public Transport ~ Bus

About 20% of all passengers use road public transport (not including taxi or similar operations). Bus access from Malpensa to Milan follows the motorway system and, apart from Milan, a number of other destinations in the region are served. Bus services connect with both Terminals at Malpensa, the Terminals are also served by a frequent shuttle bus.

Linate is also connected to the centre of Milan but only by urban bus services. Transport links between Malpensa and Linate are limited and are primarily used by SEA employees.

6.4 Public Transport ~ Rail

Of the three airports (including Bergamo), Malpensa is the only airport linked to the centre of Milan by rail. Future rail projects do not feature the integration of Bergamo and Linate into the rail network. There are frequent services and the journey time from Malpensa to Milan is approximately 40 minutes although this is expected to be reduced after ongoing improvements are completed. Future plans envisage linking Malpensa with other population centres in the region with a possible future link to the high-speed rail network.

6.5 Summary

In terms of public and private transport Malpensa is well provided for considering the distance from the centre of Milan. Linate suffers from a number of disadvantages. Firstly, there is no rail link and therefore all passengers are dependent on some form of road transport thereby adding to congestion in that part of Milan. Secondly, the position is made worse by a shortage of car parking spaces at the airport when considered as a function of the annual passenger throughput. In the Consultant's opinion (without the benefit of passenger surveys), in terms of surface access and choice of access Malpensa is now a more attractive airport compared with, say, two years ago. In conclusion, surface access is not a capacity constraint at Malpensa. In contrast, the shortage of car parking and public transport facilities at Linate is less than desirable.

7 Capacity Issues

7.1 Introduction

The purpose of the study is to examine whether the operational capacity of Milan Malpensa airport is sufficient to allow for future growth. In addition, whether the measures adopted as a consequence of the Environmental Decree, and other measures announced by the Italian Government, have had an immediate impact on airport capacity *per se*.

In general terms, it is difficult to define the capacity of different airport infrastructure components in terms of a common unit. Airside capacity is usually expressed as some function of aircraft movements per hour. Terminal and other land-side infrastructure capacity is usually expressed in terms of passenger flows per peak hour. Often it is possible to derive a relationship between passenger flows and aircraft movements for individual airports.

However, the determination of the specific slot capacity of an airport has to take into account all possible infrastructure, technical and operational constraints that affect the throughput of the airport. Therefore, the most important issue is to identify, at a given airport, the contraint9s) that influence the overall capacity of the airport. Such constraints could include surface access, car parking, aircraft parking, terminal buildings as well as airside infrastructure. In addition, capacity might be measured in terms of aircraft movements per hour, passengers per hour or another unit of measure appropriate to the type of infrastructure under examination. Often the first problem is to compare different units of capacity measurement when comparing one piece of airport infrastructure with another.

Taking each type of airport 'infrastructure' in turn then the following brief comments are made:

7.2 Surface Access

Surface access has been discussed in Section 6.

7.3 Terminals and Car Parking

7.3.1 Car Parking:

There was no discussion on car parking but land availability, and a possible proportional increase in the use of public transport, makes it seem unlikely that car parking will be a constraint to future airport expansion at Malpensa. However, car-parking facilities at Linate are less than what is recommended based on annual passenger throughput.

7.3.2 Terminals:

There are two terminals at Malpensa. Terminal 1 is primarily used for scheduled services while charter operations are concentrated at Terminal 2. Two piers (A and B) presently serve Terminal 1. Plans are in hand to build a third pier. As with most international airports there is an element of congestion during the peak-hour departure period and this no doubt will get worse as traffic levels build up. Some relief may be possible when Pier C is completed in the future. However, it is unusual for terminal buildings to be a constraint to airport development. The determination of the true capacity has to take into account other factors such as the distribution of passenger movements throughout the day, percentage of transfer traffic, internal and / or domestic operations, retail operations and passenger mix.

Linate is primarily constrained by a lack of terminal capacity, again, in the departure area (Section 4.22).

7.4 Aircraft Parking Areas

Gate stands are only provided at piers A and B, the remainder of the stands being remote stands. A number of additional gate stands will be provided when pier C is constructed in the 'near' future and additional aircraft stands have been planned at Malpensa to meet the expected increase in aircraft operations during the next few years. There is some concern that the construction of Pier C will take some remote stands out of use, due to proximity of construction traffic, but this is a matter of planning the construction process around aircraft operations and is a process that most major airports are familiar with.. Overflow parking is possible at Terminal 2 but this solution is unsatisfactory for those airlines that would consequently have to bus passengers between Terminals 1 and 2. *However, it is not considered that aircraft parking will prove to be a constraint on overall airport capacity.* The vast majority of stands are remote stands, this is not conducive to the development of hub operations. SEA Milan estimated that approximately 150 to 160 stands are possible in the future including those near Terminal 2.

7.5 Runway and Taxiway System

This will be discussed in Section 8.

7.6 Air Traffic Control

The current constraint on the Milan airport system is the capacity of the Milan Area Air Traffic Control Centre (Milan ACC) for the Linate and Malpensa (but not Bergamo) airport system. At present this has a nominal capacity of 83[1] aircraft movements per hour. The declared capacity at Malpensa has been set at 70 aircraft movements per hour which leaves a balance of 13 aircraft movements per hour for Linate. There are of course delays but not all attributable to

[1] *A figure quoted by ENAV but not supported by documentary evidence except in the Linate Capacity Study (Section 4.22)*

airport operations and constraints. It is intended to introduce new procedures that will reduce airport-related delays by 60% while still keeping within the constraints of noise limits.

However, from 18th May this year four upper airspace sectors have been moved to the Roma Area Control Centre and, together with an additional new control position operational later this year, Milan ACC capacity may increase by 7%. A new operational room is due to be open next year with a possible further increase in capacity of about 20% in the future. Consequently, Milan ACC will no longer be a constraint and between 90 and 95 aircraft operations per hour would theoretically be possible.

As far as ATC operations at Malpensa are concerned, procedures are being introduced that have been used with some success in the United States (APATSI) but not to any degree elsewhere in Europe. The runways are relatively close together but are being operated as independent parallel arrivals and departures, that is, if the environmental procedures and weather conditions allow, two aircraft can land 'simultaneously' (actually, staggered) on runways 35L and 35R. It should be noted that there is a minimum radar separation of 3nm between each aircraft. Rigorous missed approach procedures are in place but rarely used. Likewise, 'simultaneous' departures have to turn left once airborne from Runway 35L and right from Runway 35R. There are plans to introduce a Surface Movement Guidance System (ground movement radar) which will improve the efficiency and safety of low visibility and night operations. It is also planned to initiate an apron management planning system.

The control tower at Malpensa has been recently completed and is located to the south of Terminal 1 and to the north-west of the Runway 35L threshold. Controllers can view the full length of both runways and the aircraft parking area around Terminal 1. Less satisfactory is the view of the aircraft parking area around Terminal 2. *How this would be split between Malpensa and Linate would, in operational terms, depend on the respective runway capacities at the two airports.*

7.7 Summary

Car parking: Limited car parking available at Linate

Passenger Terminals: Malpensa Terminal 1 capacity to be increased by construction of Pier C. Linate Terminal capacity constrained by departures area.

Aircraft parking: New aircraft parking stands at Malpensa to be constructed to meet increased demand.

ATC: Capacity of Milan ACC to be increased from 83 up to 95 movements per hour. *How this would be split between Malpensa and Linate would, in operational terms, depend on the respective runway capacities or other limiting capacity constraints at the two airports.*

8 Runway and Taxiway Capacity

8.1 Introduction

Malpensa has two parallel runways. Runway 35L/17R has a useable length of some 3500 metres with a runway width of 60 metres. The latter is unusual as most airports have a runway width of 45 metres even for the largest aircraft. Runway 35R/17L has a useable length of about 3000 metres, again with a runway width of 60 metres. The two runways are separated by about 800 metres and are therefore classified as being dependent parallel runways. Runways 35L / 35R (aircraft landing from the south) are used for over 95% of the time.

Industry practice is such that close parallel runways such as these are not operated independently unless special air traffic control procedures are in force such as dependent parallel approaches with diagonal spacing. The procedure is not applicable to those airports where runways are designated either for arrivals or departures. However, the procedure is used at Malpensa during the 'window' period of operation when arriving aircraft are using Runway 35L in addition to Runway 35R (designated runway). However, the use of 35L for arrivals is dependent on a lull in departures from the same runway.

There is an extensive taxiway system with a number of high-speed exits from both runways. All of these, however, serve Terminal 2, but it is planned to build a high-speed exit at the far end of Runway 35L in the direction of Terminal 1. Terminal 2 is located between, but at the northern end, of the two runways which is an ideal location for a two-runway airport.

Terminal 1 is located to the west of both runways (similar to Heathrow Terminal 4). This is not the ideal location for airside operations purposes. For example, an aircraft parked at Terminal 1 and departing from Runway 35R would have to, at present, cross the active 'arrival' runway 35L albeit to the south of the runway threshold. This procedure not only delays departures, as a gap has to be found between successive arrivals, but there are also potential safety implications as well documented world-wide runway incursion incidents / accidents have demonstrated. However, crossing an active runway does not in itself reduce the capacity of the runway. For example, at Manchester airport, all departing aircraft will have to cross the designated arrivals runway but the overall runway capacity of 65 movements per hour is constrained not by that but by the separation and stagger of what are even closer parallel runways than those at Malpensa. SEA proposes to extend the taxiway system well to the south of the Runway 35L threshold to remove this conflict between arriving and departing aircraft.

Similarly, aircraft arriving on Runway 35R have to cross over Runway 35L at some point to reach Terminal 1, creating similar problems.

8.2 Determination of Runway Capacity

The capacity of a complicated runway / taxiway system is usually initially established by the use of simulation tools with fine-tuning being undertaken in the light of aircraft operations in practice. If all other potential constraints are ignored then a single runway in mixed-mode operation (both arrivals and departures) could achieve in excess of 45 movements per hour for a two or three hour period with an average delay per aircraft movement specified as being say 5 or 10 minutes. Examples of airports with this single-runway capacity include Gatwick and Manchester (note that the opening of the second runway at Manchester will increase the runway capacity from 45 to 65 movements per hour). Over an 18-hour period the daily throughput would be no more than 810 aircraft movements, assuming a constant level of demand throughout the day. In practice this would not be achievable because of the irregular pattern of demand throughout the day and because of the need to provide a 'fire-break' or recovery period after the peak hours.

The addition of a second runway does not result in a doubling of airport runway capacity. If the runways are separated by more than 1500 metres they can be operated independently of each other. If both runways are in mixed mode then a peak throughput of about 90 movements / hour would be possible. If each runway was operated on the basis of single-mode operation, as at Heathrow, then a combined capacity of about 80 movements / hour is possible. The second runway at Manchester will only result in a capacity increase from 45 to 65 movements / hour because the two runways are close parallel but staggered. The Malpensa situation is not too dissimilar from Manchester. Both airports have close parallel runways although those at Manchester are staggered. Both airports have the main terminal complex offset from the runway system. Both airports require aircraft to taxi across an active runway. The aircraft traffic mix is similar. So, the first *estimate of runway capacity at Malpensa would be in the order of no more than 65 movements / hour sustainable for say two or three hours* followed by a firebreak. This figure would of course be applicable to normal fine-weather day or night operations. This may appear to be rather a simplistic approach but, from experience, more refined and detailed simulation and operational analysis usually only squeeze a few extra movements per hour through the system.

It should be noted that, at present, the declared capacity of Malpensa is 70 movements per hour. This figure is similar to that derived by simulation studies, undertaken by SEA, using SIMMOD. However, the Consultants have been presented with no detailed information on the simulation studies, for example, average delay / aircraft movement during the peak hour or indeed whether the declared capacity is sustainable for more than one hour. *The Consultants would therefore only note that 70 movements per hour is in the same 'ballpark' to that obtainable on day to day operations by other airports and the estimate of runway capacity using the 'Methodology for the Assessment of Airport Capacity' described in the following Section*. It should be noted, however, that in terms of current and future demands for slots, the peaks are relatively short, consisting of an arrival peak followed 90 minutes later by a departure peak.

8.3 Capacity Determination (Simplified Methodology)

An alternative approach is to estimate runway capacity using the 'Methodology for the Assessment of Airport Capacity'. This was developed by Cranfield University, with Scott Wilson Kirkpatrick, for the European Commission (DGVII-C4) in 1993. This sub-section will therefore use the methodology to determine the runway capacity.

The first assumption is that of traffic mix. The vast majority of operations at Malpensa are narrow-body aircraft with an MTOW of less than 136,000kg. The traffic mix also varies during the day with most wide-body operations occurring in the morning. Therefore, four different aircraft mixes will be considered as shown in the following Table:

Traffic Mix			Mix Index	Runway	Baseline
Light%	Medium (M%)	Heavy (H%)	M + 3*H	Configuration	Capacity ac/hr
0.00	95.00	05.00	110.00	Parallel / 800m	69
0.00	90.00	10.00	120.00	Parallel / 800m	70
0.00	85.00	15.00	130.00	Parallel / 800m	71
0.00	80.00	20.00	140.00	Parallel / 800m	72

Using the methodology the baseline runway capacity varies between 69 and 72 movements per hour depending on the traffic mix. This corresponds very nicely with the present declared capacity of 70 movements / hour. However, the baseline capacity has to be factored according to the number of rapid-exit taxiways in the landing direction and the mode of operation of the runways. Different runway operational scenarios will be considered, as follows:

Scenario A (pre-Environmental Decree)

Mode of operation	Dedicated runway for arrivals / departures
Arrivals	Runway 35R
Departures	Runway 35L
Reverse thrust	Yes
Traffic mix	90% Medium, 10% Heavy
Runway capacity (baseline)	70 aircraft / hour

Note: Runway 35R has three rapid-exit taxiways. If reverse thrust is used then any one of the exits may be used. The baseline runway capacity should be multiplied by a factor of 1.0 to give the equivalent runway capacity. It is also assumed that most of the aircraft are using Terminal 1.

Runway capacity (equivalent) ***70 aircraft / hour***

Scenario B (pre-Environmental Decree)

Mode of operation	Dedicated runway for arrivals / departures
Arrivals	Runway 35L
Departures	Runway 35R
Reverse thrust	Yes
Traffic mix	90% Medium, 10% Heavy
Runway capacity (baseline)	70 aircraft / hour

Note: Runway 35L has no rapid-exit taxiways. It is assumed that reverse thrust is not used. The baseline runway capacity should be multiplied by a factor of 0.90 to give the equivalent runway capacity. It is also assumed that most of the aircraft are using Terminal 1.

Runway capacity (equivalent) ***63 aircraft / hour***

Before the construction of Terminal 1, both Runway 35L and Runway 35R had rapid exit taxiways towards what is now Terminal 2 and therefore there was no difference in terms of overall runway capacity as to which runway was dedicated to arrivals.

The following two scenarios represent the full application of the D'Alema decree, that is, dedicated runway operations for arrivals and departures, ban on the use of reverse thrust and the other procedures (Chapter 3, noise abatement etc.) should be applied.

Scenario C (post-Environmental Decree) (Full Application of D'Alema Decree)

Mode of operation	**Dedicated runway for arrivals / departures**
Arrivals	**Runway 35R**
Departures	Runway 35L
Reverse thrust	**No**
Traffic mix	90% Medium, 10% Heavy
Runway capacity (baseline)	70 aircraft / hour

Note: **If only idle-thrust is used then only the far high-speed exit (out of three) is assumed to be of operational use**. The baseline runway capacity should be multiplied by a factor of 0.97 to give the equivalent runway capacity. It is also assumed that most of the aircraft are using Terminal 1.

Runway capacity (equivalent) ***68 aircraft / hour***

Scenario D (post-Environmental Decree) (Full Application of D'Alema Decree)

Mode of operation	**Dedicated runway for arrivals / departures**
Arrivals	**Runway 35L**
Departures	Runway 35R
Reverse thrust	**No**
Traffic mix	90% Medium, 10% Heavy
Runway capacity (baseline)	70 aircraft / hour

Note: **Runway 35L has no rapid-exit taxiways. In any case, it is assumed that only idle-thrust is used.** The baseline runway capacity should be multiplied by a factor of 0.90 to give the equivalent runway capacity. It is also assumed that most of the aircraft are using Terminal 1.

Runway capacity (equivalent) ***63 aircraft / hour***

To summarise the results so far, Scenario 'A' represents the usual way in which the runway system at Malpensa was operated before the introduction of measures outlined in the Environmental Decree. Scenario 'B' indicates the potential disadvantages of using Runway 35L for 'Arrivals' destined for Terminal 1 as the overall runway capacity is reduced due to a lack of high-speed turnoffs. Scenario 'B' is therefore not used for arrivals under normal operational circumstances.

Scenarios 'C' and 'D' indicate the impact on runway capacity due to the implementation of the D'Alema Decree including the 'ban' on reverse thrust. This does not represent the two-hour window period (which ignores the Decree). If arrivals are using Runway 35R then the ban on reverse thrust results in a reduction of 2 movements / hour. If arrivals are using Runway 35L then the reverse thrust ban has no further effect on runway capacity as the absence of high-speed exits has already reduced the runway capacity from 70 movements / hour to 63 movements / hour.

Under certain circumstances (Section 5.2) aircraft will be allowed to land on Runway 35L although Runway 35R is the designated 'arrivals' runway. This is unlikely to result in an increase to overall runway capacity but will reduce taxiing distances for aircraft using Terminal 1.

The analysis of Scenarios 'A' to 'D' inclusive indicate that without the benefits of reverse thrust, and therefore use of available high-speed exits, the baseline runway capacity may be significantly reduced below 70 movements / hour. *For example, using Runway 35L for arrivals may result in a significant overall reduction from 70 to 63 movements / hour.* Thus, it has been demonstrated that using Runway 35R for arrivals continues to be the best option for Malpensa. The analysis in this sub-section, and the previous sub-section, therefore indicates that during an operational day, the runway capacity at could vary quite significantly taking into account variations in traffic mix and which runway is designated as the main 'arrivals' runway.

8.4 Impact of Environmental Measures on Runway Capacity

Although the remit of the study is to examine the impact of the environmental decree on runway capacity at Malpensa, other operational and political issues confuse the problem of runway capacity.

There is no doubt that *some* of the measures that have been introduced are no more stringent than those implemented at other airports. A reduction in the numbers of Chapter 2 aircraft at many airports has been achieved by night-bans or charging structures. Often this measure has been adopted as a trade-off for obtaining planning permission for new infrastructure developments. The interest by the Commission in proposals for 'Chapter 4' measures has also added impetus to measures towards the control of aircraft noise and therefore the noise and emissions impact on the population in general. What is of some concern is the selective use of environmental measures for one particular airport.

So, what is the impact of the environmental measures on runway capacity? Firstly, the banning of Chapter 2 aircraft has no operational impact on runway capacity. Of greater impact would be variations in traffic mix, aircraft performance and operational procedures used by air traffic control.

Secondly, the reduction of engine power for departures at 1000 ft (rather than 1500 ft) has more safety implications rather than any influence on runway capacity. This procedure is a variant of that set out in ICAO Annexes / Standard and Recommended Procedures and has been accepted by most pilots of US-based airlines and British Airways (source: Mr Renato Aggio). However, pilots from other European airlines are very much against the procedure that is (a) difficult to enforce and (b) appears to be generally ignored. Nevertheless, such a procedure has no measurable impact on runway capacity.

However, the banning of reverse thrust for landing aircraft has some potential impact on runway capacity although such an impact depends also on traffic mix, taxiway layout and mode of runway operation. The basic regulation of runway operation is that there should be only one active aircraft (landing or departing) on a runway at any one time. Therefore, in mixed-mode operations, the quicker a landing aircraft vacates the runway, the quicker the departure aircraft can be cleared to commence take-off. For example, at Gatwick and Manchester, pilots are encourage to apply reverse thrust and vacate the runway using the first possible high-speed exit, allowing maximum time for departures to be slotted in between arrivals.

At Malpensa there appears to be no ban on idle-thrust. There are also no high-speed exits towards Terminal 1 from Runway 35L. If there were high-speed exits towards Terminal 1 and reverse-thrust were permissible then runway occupancy time could be reduced by say 20 seconds and over an hour this could possibly allow an extra 5 or 6 movements. If the runway were only used for single-mode operations then the use of reverse thrust offers little potential for increasing runway capacity unless two or more high-speed exits were constructed. It should also be noted that the use of reverse thrust is allowed for safety / operational reasons and therefore one must conclude that this regulation is almost as unenforceable as that for reducing engine-power. *Nevertheless, the banning of reverse thrust and the use, for part of the day, of Runway 35L for arrivals results in the effective runway capacity being reduced from 70 to 63 movements / hour.* *Alternatively, if the environmental measures are ignored or not properly applied then the runway capacity at Malpensa is that calculated for Scenarios A and B (Section 8.3).*

Other ATC procedures have been introduced with the aim of increasing runway capacity. However, these have also met with some resistance from pilots and therefore such procedures cannot be viewed as producing a significant increase in runway capacity.

It would seem that the testing of the environmental measures is not being adequately addressed at present. It is believed that the designation of runway use at specific times of the day is confusing especially as these designations change from one day to another. The use of peak-hour windows further compounds the confusion albeit with the intention of maximising runway capacity during peak hours. Lastly, allowing the controllers an element of discretion, again for operational reasons, completes the confusion. The airlines are suffering from uncertainty with changes to procedures, departure routes and how traffic growth is going to be met by the authorities in the future. None of this leads to the efficient operation of a system.

8.5 Summary

The runway system has been examined from two viewpoints. Firstly, the potential runway capacity has been examined by comparing operations at Malpensa with best practice at other European airports. Secondly, as a cross-check, by calculating the runway capacity using a methodology that was developed in 1993 for the Commission.

Comparing Malpensa with other airports, Manchester being a reasonable example, the Consultants believe that, under current operating conditions, *a runway capacity of about 65 movements / hour is sustainable for two to three hours* followed by a 'fire-break' to allow a catch-up period for delayed aircraft.

As this assessment was judgmental a cross-check was made by using a simplified methodology for the calculation of runway capacity that was developed for the Commission in 1993. Although based on FAA practice (with higher runway throughputs in the United States compared with European practice) initial calculations indicated a runway capacity of about 70 movements / hour but with minor variations from this capacity depending on aircraft mix. Taking into account the environmental measures, especially the banning of reverse thrust, the current taxiway layout and which of the two runways is the designated arrival runway, it became apparent that the runway capacity would be significantly reduced. *For example, the ban on reverse thrust could result in the loss of 7 movements / hour from 70 to 63.* In view of this, *the consultants believe that their previous estimate of 65 movements / hour to be a reasonable estimate of sustainable runway capacity for two or three hours at the present time taking into account the taxiway layout and the environmental measures currently in force.*

9 Forecasting

9.1 Methodology

There has been a significant change in the use of Linate (LIN) and Malpensa (MXP) during the Milan airport systems' recent history. There has also been a significant change in the use of the system's major customer (Alitalia) as it has moved a number of flights from its Rome base to Milan. Therefore, it has not been appropriate to use traditional forecasting methodologies such as time series analysis or econometric forecasting. Had the changes in airport usage and hub development been further in the past, time series modelling may have been a suitable approach as greater emphasis could have been placed on the more recent data; however, there are insufficient data subsequent to these changes to make such modelling approach robust.

Econometric modelling could have coped with the changes in the trends had a change dummy variable been applied to the 1998/9 data. Again there are insufficient data to enable a robust modelling approach of this type. Consequently a judgmental forecasting approach has been adopted. This approach evaluates the trends in the data, and applies expert knowledge of the changes happening in the Milan airport system and the wider Italian air transport market to develop base case, pessimistic and optimistic forecasts for the forecast period. The expert knowledge has been developed by the consultant team both in the normal course of their work and also in the research for this project during visits to Milan and discussions with various actors in the market.

9.2 Forecast for 2000

SEA has provided forecast figures for 2000 for MXP and LIN. These have been adopted for the purpose of the forecast. However the forecast team have actual figures for both airports for 2000 Jan-June. The six months of actual data when simply multiplied (by two) to provide full year estimates come up some 1.22 million passengers down on the SEA forecast for 2000. The vast majority for this shortfall seems to be at LIN. It is highly possible that the traffic patterns for Milan are more heavily weighted towards the second half of the year; however, the forecasters did not have year on year monthly statistics with which to examine this plausible explanation for these differences. Consequently the forecasters have adopted the SEA forecast for 2000.

The segmental breakdown for 1999 (highlighted in bold italics) have been estimated by applying the frequency split between domestic and international flights at MXP and LIN in 1999 (these figures were sourced from Cranfield's OAG world flight guide database, June 1999). Similar segmental splits were applied to the SEA forecasts for 2000. Although the full OAG database for June 2000 was not available to the forecast team an analysis of the schedules for June 2000 revealed a similar number of domestic flights in 2000 as in 1999 and therefore a similar segmental split was considered appropriate.

The number of scheduled flights per week at LIN and MXP demonstrates the changes at the airports. The international flights scheduled at LIN in 2000 possibly indicate an over-estimation of the number of flights at this airport for 2000. However, by June of 2000 there had been nearly 3 million passengers at the airport, again supporting the SEA estimate.

Frequencies per week, June 1998, 1999, 2000 (OAG)

	MXP		LIN		Total
	Dom.	Int.	Dom.	Int.	
1998	145	195	726	1,019	2,085
1999	762	1,292	371	345	2,770
2000	744	1,668	332	98	2,842

Forecasts for 2001 to 2004 were developed by applying judgmental passenger and aircraft movement growth using base, low and high case scenarios. The growth levels are given in Annex 3.

9.3 Base Case

The main changes in the switch from LIN to MXP and also from ROM to MIL have already been seen in 1998 and 1999. MXP seems to have significantly higher growth than LIN as Alitalia establishes a major hub there. Higher than normal growth is likely to continue in 2001 as hub developments continue. After this time the forecasters believe that growth will begin to return the MIL system growth levels prior to 1998. The domestic market is likely to slow quicker than international passenger numbers. There is likely to be no growth in the transit markets as the hub develops. Overall the forecasts see 11% growth in 2001, 9% in 2002 and 7.5% in 2003. At LIN the domestic market is forecast to grow at 5% a year throughout the forecast period whereas the international traffic under the new traffic distribution ruling sees some growth in 2001 but at this stage the market stagnates.

The overall effect is system wide growth of 10% in 2000 and 9.5% in 2001, falling back to 7.5% growth in 2002 and 6% in 2003

9.4 Low Case

The low case forecast takes the same figures for 2000 but shows growth at 1.5% less than the base case in all subsequent years.

9.5 High Case

The high case forecast takes the same figures for 2000 but shows growth at 1.5% more than the base case in all subsequent years.

9.6 Air Traffic Movements

To forecast ATMs an average aircraft load was adopted at each airport and then used to divide the passenger numbers into aircraft. At MXP the average aircraft load was estimated at 80 in 2000 rising to 85 in 2001, 90 in 2002 and 95 in 2003. This increase in the average passenger per aircraft load reflects the increasingly international nature of the flights at MXP (which has a tendency for larger aircraft than domestic flights), and increasing seat factors as Alitalia develops its hub. At Linate, the average passenger load is estimated at 73 throughout the forecast period. The result of this forecast is given in the table below.

	MXP (base)			LIN (Base)		
	Pax	ATMs	Ave pax load	Pax	ATMs	Ave pax load
1994	3,679,408	40,460	91	10,134,307	136,888	74
1995	3,892,135	45,900	85	10,827,059	151,620	71
1996	3,803,153	41,879	91	12,563,446	177,509	71
1997	3,920,905	38,496	102	14,271,145	165,741	86
1998	5,919,592	72,625	82	13,611,749	155,216	88
1999	16,914,475	219,698	77	6,553,471	91,140	72
2000	*18,867,159*	*235,839*	*80*	*6,877,542*	*94,213*	*73*
2001	*20,961,527*	*246,606*	*85*	*7,221,419*	*98,924*	*73*
2002	*22,879,291*	*254,214*	*90*	*7,405,385*	*101,444*	*73*
2003	*24,606,583*	*259,017*	*95*	*7,598,549*	*104,090*	*73*

Note that both sets of forecasts assume that demand is not constrained.

9.7 Implications of Base Case Forecasts on Airport Capacity

Air transport movements at Malpensa are forecast to increase from 220,000 in 1999 to 259,000 in 2003. This is equivalent to an average of 710 movements per day or 42 movements per 17-hour operational day. A relationship was used, developed for design purposes (source; UK Civil Aviation Authority), that links annual aircraft movements with the number of 'peak' hour aircraft movements. Using this relationship, then an absolute peak hour rate of about 68 movements and a standard busy hour (30th busiest hour) of about 63 movements per hour is predicted at Malpensa for 2003.

Although a significant increase in passenger numbers has been forecast, the increase in aircraft movements is less as the average number of passengers per aircraft movement is predicted to also increase over the same period. On this basis, the existing maximum runway capacity of 65 to 70 movements / hour at Malpensa would be just sufficient until 2003 although the traffic peaks are likely last much longer than the present one hour in the morning and one hour in the evening. Using a similar relationship between peak hour passengers and annual passengers then the Standard Busy Hour for terminal passengers would be in the order of 7000 passengers / hour.

Using the same relationships for Linate, the 1998 traffic data indicates a peak of about 30 aircraft movements which is in line with the declared runway capacity at the time. However, the forecasts for 2003 indicate a similar level of peak aircraft movements (in theory) because although there has been an overall decrease in passenger numbers, the number of passengers per aircraft movement has fallen even more sharply. In practice, with a declared capacity of 13 movements per hour at Linate, the constrained peak traffic demand will continue to be redistributed throughout the day resulting in a flat demand curve that matches the declared capacity of the airport.

An interesting example is the recent announcement by 'Go' (who serve Malpensa three times a day) that a new service will commence in September from Stansted, arriving at Linate at 2305 hrs local and departing the following morning at 0730 hrs. This is a classic example of an airline taking advantage of off-peak opportunities at Linate despite restrictions imposed by the current traffic distribution rules.

Application of the High and Low Case forecasts will result in some variance to the projected figures for peak hour aircraft movements and passenger flows. However, because the forecast period of three years is comparatively short, such variability is probably no more than the margin of error of the peak and annual relationships that have been used.

9.8 Summary

Although the traffic forecasts have been developed for the comparatively short time frame of three years, the process has been complicated by a significant switch in traffic from Linate to Malpensa at the beginning of 1999 and to a lesser extent at the beginning of 2000. In addition, congestion at Linate (1997 / 98) resulted in a significant increase in passengers / aircraft movements while the same statistic at Malpensa has been even more erratic while expected to settle down in the future.

A series of three forecasts have been prepared: base, low and high for both airports. These are reproduced in Annex 3. Double-digit passenger growth is forecast at Malpensa for the next two calendar years after which the rate of growth is expected to slow down. When translated into equivalent aircraft movements, it is anticipated that growth will not be constrained by runway capacity (or other) limitations but that there will be an increase in the duration of the traffic peaks from about one hour perhaps two or three hours. Annual passenger traffic (Base Case) at Malpensa is expected to reach 24.6 million per annum in 2003 with aircraft movements in the peak hours forecast to be between 62 and 68.

Applying the same techniques to Linate, passenger numbers are expected to reach 7.6 million per annum in 2003. This is below the nominal capacity of 8 million. However, forecast peak aircraft movements of 30 per hour are somewhat incompatible with the present declared capacity of 13 movements per hour. What is happening in practice is that the demand through the day at Linate appears to be almost constant at just below the declared capacity and that there is no peaking of traffic flows.

10 Hub Operations

10.1 Characteristics of an Effective Hub

10.1.1 Geographical location

There are several key features an airport must satisfy if it is to operate as an effective hub. To start with geography plays an important part in the opportunity for an airport to develop as a hub. Circuitous routings are not very marketable. Where a significant backtrack is involved, passengers are likely to be deterred by the increased flying time (freight is less fussy!) whilst the increase in costs may mean that airlines are unable to offer a viable fare. A central geographical location in relation to a wide range of major markets therefore offers both efficiencies and competitive advantages.

By targeting specific connecting flows, other airports can still obtain opportunities to capture hub passengers. An airport such as Lisbon is unsuited to intra-European traffic but may be an optimal location for the Europe-South America market. Copenhagen is poorly located in relation to mainland Europe and the main long-haul flows but is well situated to act as a gateway to Scandinavia.

The major hubs in Europe (Paris, Amsterdam, Frankfurt) are located on a NW / SE axis that lies approximately on a line between the United Kingdom and Italy. Milan Malpensa lies on this axis and therefore is reasonably well located to serve as a hub linking the long-haul market with most European destinations. However, like Lisbon, Malpensa is probably less suited to serving the purely intra-European market except as a link between Northern Europe and the Mediterranean or Western Europe with South-Eastern Europe.

10.1.2 Terminal configuration and minimum connect times

The efficiency of airports at processing passengers and baggage is broadly reflected in the Minimum Connect Time (MCT). This represents the minimum interval that must elapse between a scheduled arrival and a scheduled departure for two services to be booked as a connection from one service to another. At some airports one MCT applies to all services while in other cases a range of different MCTs may be in operation depending on the airline, terminal, type of passenger and route. Although airlines have the scope to adjust these MCTs for competitive reasons (for example, inflating interline MCTs in relation to ones that are on-line or with preferred partners), an airport or airline with a short MCT will have the potential to offer faster connections than its rivals. At congested airports, it is often necessary to build some contingency allowance for late arrivals into the MCT to try and ensure that most passengers stand a chance of making their connecting flight.

Terminal design is thus a critical factor in minimising connection times. Multiple terminals set some distance apart are not well suited to connecting traffic. At least the locally based airline should be within one terminal as they have the greatest hubbing potential. At many airports, international and domestic services are segregated between terminals. This may be administratively efficient but is unsatisfactory for hubbing purposes, as there is invariably strong demand for domestic-international transfers. Birmingham Eurohub is one example that has overcome this.

Malpensa has two terminals but one of these, Terminal 2, is primarily for Charter operations. Terminal 1 is used by Alitalia for both domestic and international operations. One potential problem with hub development at Malpensa is the use of remote stands. At present, only two satellite piers (A, B) are in operation. The construction of Satellite C will increase the proportion of pier stands and hence allow MCTs to be kept as low as possible. This is essential for the development of hub operations.

10.1.3 Local demand

As far as the transfer passenger is concerned, it does not matter which specific city the hub is located in. They could interchange in the middle of the desert if there is a convenient hub available serving their own market (a 'wayport') and may actually obtain some benefits from seeking an interchange airport that is not congested with local traffic. Nevertheless, strong local demand from the hub can help underpin a wider range of services and frequencies, especially on long-haul routes.

As a major industrial centre, Milan is capable of generating a strong local demand to feed both long-haul and European services.

10.1.4 The scheduling issues

Scheduling is probably the most critical factor in operating an effective hub. There is little point in having superb airport facilities in a major city at the heart of Europe if passengers have to wait 4 hours for their connecting flight. In this time they could have flown another 3000 km!

An essential element of any serious attempt to maximise the scope of an airport as a hub is to concentrate activity into a limited number of peaks or waves during the day. These should see a large number of inbound flights arriving during a short space of time then departing again as soon as a sufficient interval in which to redistribute passengers and their luggage has elapsed. Each pair of arrival and departure waves can be described as a complex of flights. The transfer time between flights in the same complex will be close to the best attainable. The wave pattern can be clearly seen when looking at the traffic profile of arrivals and departures at Amsterdam. However, the level of congestion at Heathrow is such that no discernible wave pattern is evident.

A similar wave pattern can be seen at Malpensa where there are two waves or complexes of traffic each day. This is primarily due to scheduling set up by Alitalia. In the morning, long-haul *arrivals connect to short-haul flights within Europe. In the evening, the emphasis is more on transfers between intra-European flights.*

10.2 Consequences of Hubbing

Ample runway capacity is an essential prerequisite of a successful hubbing operation. Through bunching of flights, severe peaking of arrivals and departures is necessary to optimise the availability of connections and some spare capacity is preferable to allow a margin for absorbing delays. Two contrasting airports, Heathrow and Amsterdam, illustrate the varying potential for hubbing in Europe.

London Heathrow, with only two runways, is an example of an airport where waves of flights are not operated. Instead, one runway is used for arrivals and one for departures. As the airport is running close to capacity this leads to an almost uniform pattern of activity across the day with about 20 arrivals and 20 departures in each half hour period. British Airways, the dominant airline has around 40% of movements in each interval. Heathrow is therefore not a typical hub airport because of demand and the associated congestion.

Amsterdam has five runways although for environmental reasons operates three at any one time. At Amsterdam, KLM operates a connecting hub with three main complexes of flights per day and an emerging fourth one in the mid-afternoon. Short-haul aircraft are mainly stabled abroad overnight, flying into Schiphol in the early morning. The other airlines using Amsterdam are more random in their pattern of movements although there is some further concentration around the KLM peaks, mainly from independent commuter airlines providing additional feed but also some long-haul carriers looking to take advantage of the European connection opportunities. At least two parallel runways are required in-service permitting simultaneous arrivals or simultaneous departures. Compared to major US hubs however, Amsterdam still has some way to go to replicate the extreme concentration into very sharp short waves where typically 40 aircraft may arrive in the space of only 20 minutes.

Whereas Heathrow has a steady pattern of movements all day, at Amsterdam there is around a three-fold increase in the peak period compared to the average. As well as requiring use of multiple runways, this poses major problems for airport operators in relation to terminal capacity. It also imposes a cost penalty on the hub airline because it obtains less than efficient utilisation of its ground staff and facilities. Everything from the number of terminal gates to baggage handling to check-in counters must be designed to cope with the peaks. Based on average aircraft sizes and load factors 3500 passengers would be expected to arrive in the busiest half-hour at Amsterdam. This compares with about 3000 at Heathrow, where total traffic is twice as great.

At Malpensa there are two parallel runways but, unlike runways at Heathrow, Amsterdam, Paris CdG and Frankfurt, these cannot be operated independently. Ideally, a successful hub will have either two independent parallel runways or a three runway system allowing two runways to be dedicated for arrivals and one for departures or vice versa. To be a successful hub, Malpensa *ideally needs a third (and independent) runway, as well as meeting the characteristics of a successful hub outlined in Section 10.1. Otherwise Malpensa may go the way of Heathrow with a constant demand of arrivals and departures throughout the day with transfer traffic dependent on city-pair frequency rather than a dedicated hub operation.*

10.3 Summary

Alitalia has set a hubbing operation at Malpensa which is working reasonably well. However, there must be some doubt as to whether Alitalia / Malpensa could ever emulate say KLM / Amsterdam. Leaving aside the thorny problem of airline alliances, potential constraints to further hub development in the future could include:

- limitations to overall runway capacity and therefore peak hour arrivals or departures that could be sustained by the runway system;
- the ratio of pier to remote stands will determine what level of MCT can be offered by the airport;
- existing and potential environmental constraints on infrastructure development including the construction of a third runway; and
- European-wide delays to flights that, for all hubs, have led to increased block-times and a greater time margin between the arrival and departure of transfer flights.

11 Discussion and Conclusions

Milan and its hinterland is the centre of industrial and economic growth in Italy and this is reflected in the level and type of traffic using the Milan airport system. Apart from an extensive network of domestic services, the Milan airport system has a frequent network of services linking Milan with other major European industrial centres. In addition, apart from the traditional 'home carrier' dominance, Malpensa acts as a long-haul hub for Alitalia.

Air transport passenger growth is forecast to increase rapidly for another two years after which growth rates will reduce to nearer the European average. For example, passenger throughput at Malpensa is expected to increase from 16.9 million in 1999 to 24.6 million in 2003, an average increase of just under 10% per annum. Likewise, passenger movements at Linate are expected to increase from 6.5 million in 1999 to 7.6 million in 2003 (Section 9.6). The number of passengers per aircraft movement is also expected to increase at Malpensa during the same period although the equivalent for Linate is expected to remain static.

However, traffic forecasts have had to take account of the transfer of flights from Linate to Malpensa at the beginning of 1999. The forecasts are also influenced, to a lesser extent, by the transfer of approximately 50 flights per day (equivalent to just over one million passengers per annum) from Linate to Malpensa in early 2000. Notwithstanding the transfer of flights, the overall passenger numbers for the Milan airport system (Malpensa + Linate) showed a continuous increase throughout the period 1994 to 2000 (June) and are expected to do so for the foreseeable future.

The Preliminary Report indicated that it is too early to determine if any airlines have suffered significant traffic loss as the result of the transfer from Linate to Malpensa. However, May 2000 traffic data indicates that only KLMuk (Buzz) has suffered a significant drop in passenger numbers over the previous 12 months and that both KLM and Lufthansa have seen a drop in cargo over the same period. However, Malpensa serves a different catchment area that includes a significant proportion of industrial activity and therefore it could be argued that there are new marketing opportunities for the airlines to exploit.

Surface access to Malpensa has improved in recent years and includes a rail link to Milan, and in the future to other destinations, that offer a similar travel time to that by taxi from Milan (Centre) to Linate. Section 6 and Annex A3 dealt with surface access in some detail. It was concluded *that the choice and cost of surface transport modes to Malpensa are such that the location of the airport from the city centre should be no longer considered a disadvantage and a reason to prefer Linate.*

Malpensa Terminal 1 (check-in area) and the aircraft parking areas (particularly wide-body aircraft stands) are congested during peak hours (as are most International airports) but plans are in hand to construct Pier C and additional aircraft parking areas to match the current growth in demand. In view of the current expansion plans *it is not considered that Terminal 1 and the* *aircraft parking areas are likely to constrain demand growth at Malpensa within the next three years.*

The taxiway system at Malpensa is not ideal. There are no high-speed turn-offs from Runway 35L towards Terminal 1 although plans are in hand to construct one. Aircraft moving from Terminal 1 for departure on Runway 35R have to cross the active arrivals Runway 35L. However, there are plans to construct an additional taxiway to the south of the Runway 35L threshold linking Terminal 1 with Runway 35R.

Alitalia dominates both Malpensa and Linate airports with 55% of passenger traffic at Malpensa and 52% at Linate. Equivalent figures for cargo are 65% and 17% respectively. Traffic at Linate is primarily point to point with Rome being the major destination. Traffic at Malpensa is more geared towards the transfer of passengers to / from Alitalia long-haul operations to other short and medium haul routes.

The declared capacity of the Malpensa runway system is 70 movements / hour while that for Linate is currently 13 movements / hour. In the past, Linate has operated with up to 32 peak hour movements but is now constrained, partly because of the constraints of Milan Area Control Centre (ACC) and partly because the capacity limitations inside the terminal building of Linate Airport.

The capacity of Milan Area Control Centre is presently 83 aircraft movements per hour. It is expected that this capacity will increase within the next 12 months to about 90 / 95 aircraft movements / hour. The capacity of Milan ACC effectively limits the number of aircraft flying to / from Linate and Malpensa. Therefore, if Milan ACC has increased capacity then a corresponding increase in capacity should be possible for the Milan / Linate airport system. For example, the total number of aircraft flying to Linate and Malpensa could also increase to 95 movements / hour. The distribution of these additional flights (ignoring traffic distribution rules) depends on (a) the sustainable capacity at Malpensa, (b) the sustainable capacity at Linate and (c) whether or not the traffic peaks at Linate and Malpensa coincide. *If, as seen later, the declared capacity at Malpensa is likely to be limited to no more than 70 movements / hour then, in theory, Linate should be able to accept up to 25 aircraft / hour subject to other constraints (terminal capacity, car parking) being overcome.*

The above conclusions have concentrated on the background to the issue. The following conclusions will concentrate specifically on operations at Malpensa.

Standard practice in the United Kingdom for declaring runway capacity is to specify a certain number of movements per hour sustainable for a specific period of time and with an average delay of 'X' minutes per movement. For example, Manchester might have a declared capacity of 45 movements / hour over a three hour period with an average delay of 10 minutes / movement during the same time interval. This would then be followed by a short period of time with a reduced number of aircraft movements to allow for a recovery in delays.

The declared capacity at Malpensa is 70 movements per hour. There is neither any information on the number of operational hours that this declared capacity is sustainable for nor is there any information on the acceptable average delay per movement during the same time interval. *In any case, ATC and other delays that airlines are subjected to (this applies to most airports in Europe) may obscure the cause of operational delays at Malpensa.*

The sample of slot allocation data, for the current summer season and the following winter season, indicates that there are only one or two hours each day at Malpensa (morning peak, evening peak) where the slot demand approaches or equals the declared runway capacity. For much of the remainder of the day, slot demand varies between 50 and 65 movements / hour.

In the opinion of the Consultants, taking into account the <u>current</u> runway and taxiway layout at Malpensa (but ignoring the potential impact of environmental measures), a declared runway capacity of 70 movements per hour would be difficult to sustain for say a continuous period of three hours. In any case, a declared capacity of 70 movements / hour requires Runway 35R to be used for arrivals (because of the high-speed exits) whereas Runway 35L is more appropriate for departures. This was in fact the normal mode of operation before the introduction of the environmental measures.

A more realistic runway capacity might be in the order of 65 movements per hour for say three hours followed by a firebreak to allow delay recovery. This takes into account terminal 1 being offset to the west of both runways. It is not believed that the declared capacity of the runway system at Malpensa could be increased significantly above 70 movements / hour in the foreseeable future.

The final comments will deal with the matter of environmental measures and their impact on runway capacity:

- *The reduction of engine power on take-off at 1000ft v 1500ft has safety implications but <u>no</u> influence on runway capacity. In any case, this procedure seems to be have been largely ignored and <u>therefore must be regarded as not being enforced at present.</u>*

- *Restriction of operations to Chapter 3 aircraft only has been enforced but has <u>no</u> influence on runway capacity.*

- *The ban on the use of reverse thrust will result in a reduction in runway capacity but this will also depend on traffic mix and the mode of runway operation. For example, the banning of reverse thrust when Runway 35R is used only for arrivals would result in only a marginal reduction of 2 movements / hour. However, application of the ban for Runway 35L arrivals would be more critical as there is no high-speed turn-off towards Terminal 1 and the overall system capacity could be reduced to 63 movements / hour. There are plans to construct a single high-speed turn-off but this would be at the far end of Runway 35L. As with other procedures introduced as part of the environmental measures, the ban on reverse thrust may be ignored for operational reasons and is also* *difficult to enforce. However, this procedure is presently in operation as specified in the Environmental Decree.*

- *The alternate use of runways for arrivals and departures, as specified in the Environmental Decree, is not being strictly applied as the alternate use of the runways is not required during certain specified time periods ('windows') and the requirement is relaxed when operational conditions allow.*

- *The introduction of advanced ATC procedures will, subject to acceptance by pilots, offer the potential for a marginal increase in runway capacity but, again, this is dependent on traffic mix and the mode of runway operation. At present, advanced ATC procedures are being used only to a limited extent.*

- *The current arrangement of runway operations, varying from one day to another and with 'exemptions' for operational reasons, is confusing and does not lead to the efficient operation of a runway system. It also makes the calculation of the 'true' capacity rather difficult as the theoretical capacity changes significantly when Runway 35L is used for arrivals. In the opinion of the Consultants, this form of runway system operation leads to unnecessary delays and inefficiency, with consequent safety implications. Furthermore, the 'fine-tuning' that is presently being undertaken by SEA to determine the effects of the environmental measures should have been undertaken before the final transfer of flights from Linate to Malpensa in early 2000.*

12 Recommendations

The Milan airport system has a number of capacity bottlenecks that may lead to a constraint on the growth of the air transport industry that presently serves the Milan airport system. To meet the aspirations of all parties concerned the Consultants would recommend that consideration be given to:

- *Finalise the implementation of environmental measures in the hinterland of both airports with a view to balancing the desire to reduce aircraft noise with the need to avoid constraining the growth of the air transport industry*
- *Current expansion plans for Milan ACC should be continued so as to increase the centre capacity to at least 95 movements / hour in the short-term.*
- *Construction of Pier C, Malpensa Terminal 1, should commence both to reduce current congestion and to enhance hub operations.*
- *The construction of new stands at Malpensa should continue to match the current and short-term demand for aircraft parking.*
- *Construction of at least one (preferably two) high speed exits from Malpensa Runway 35L towards Terminal 1is required to maximise the operation efficiency of the current runway system.*
- *Extension of the taxiway system to the south of the threshold of Malpensa Runway 35L to ensure that departures on Runway 35R are not delayed or in conflict with arrivals on Runway 35L.*
- *The long-term development of Malpensa as an international hub, comparable with Paris, Amsterdam or Frankfurt, would depend on political and environmental attitudes towards the construction of a third runway.*

Consideration should be given to increasing the declared capacity of Linate in order to take advantage of the additional capacity offered by Milan ACC and to meet the expected growth in traffic. To achieve this would require:

- *The improvement of public transport links to Linate and the construction of additional car parking.*
- *Enlargement of the existing terminal building especially in the departures area and taking into account the need of what is a predominantly point to point market.*
- *Re-appraisal of traffic distribution rules to enable airlines to develop the point-to-point market linking Milan Linate with other domestic airports and major international destinations while at the same time concentrating hub, charter and freight operations at Malpensa.*

13 References and Bibliography

- Commission Decision of 16 September 1998 on a procedure relating to the application of council regulation (EEC) No. 2408/92 (Case VII/AMA/11/98 - Italian traffic distribution rules for the airport system of Milan).
- Milan_99 Real-time Simulation, Eurocontrol, dated August 1999
- Decree from Il Ministro dell'Ambiente, dated 25 November 1999
- Italian Government Decree, dated 13th December 1999
- Malpensa Airport Infrastructure Study, Alan Stratford & Associates, December 1999.
- *Modalità di esercizio dell'infrastructura aeroportuale della Malpensa*: This is a report from the Minister for Transport and Shipping to the Italian Government, dated 25th February 2000.
- Communication from the Minister for Transport and Shipping dated 3rd March 2000.
- Communication from Lufthansa to Simmons & Simmons Grippo, dated 10th March 2000
- An evaluation of the ATS Operational Capacity at Malpensa Airport, Frumarola and Crespi, dated 13th March 2000
- NOTAM 14th March 2000 referring to implementation of procedures on 26th march 2000
- Report on Milan Air Traffic Control, Amico.atc, dated 10th April 2000
- Analysis of infrastructure and operations at Milan Linate Airport, Ente Nazionale per l'Aviazione Civile (ENAC), April 2000.
- Traffic data for European airports, January to April 2000, SEA
- Traffic data for Milan airport system, June 1 - 25, 2000, SEA
- Origin / destination and other traffic data for Milan airport system, May 2000, SEA
- Airport punctuality data for Malpensa, SEA
- Studio Acustico dell'Aeroporto Malpensa 2000, Modulo Uno, 2000
- Capacity data for Aeroporto Malpensa, Ente Nazionale di Assistenza al Volo, 2000
- Arrival, departure and total demand at Malpensa for 12th June 2000
- Slot allocation data for Malpensa (various dates), Assoclearance
- European ATC Regulations for 21st June 2000, supplied by ENAV / FMU
- Flight delays for 7th / 20th June 2000
- Average traffic delay at Malpensa, Fiumicino, Heathrow, Gatwick, Charles de Gaulle, Orly, Madrid, Barcelona, Frankfurt, Munich, Zurich, Brussels and Amsterdam for the 22nd and 25th June
- Arrivals and departures at Malpensa from the 18th May to 16th June inclusive.
- Linate airport ~ Analysis of the infrastructure and operational capacity of the airport, ENAC, 3rd April 2000.
- Communication from Simmons & Simmons Grippo, 30th June 2000
- ACI Traffic Statistics 1995 - 1998
- Methodology for the Assessment of Airport Capacity for the European Commission, Cranfield University, December 1993
- OAG Timetable (various)
- FAA Advisory Circular 150/5060-5

Annex 1 Synopsis of Meeting Discussions

A1.1 Introduction

Two meetings were held, the first in Rome on 26th June and the second on the 27th June at Milan Malpensa Airport. A list (not 100% complete) of the participants, some of whom were present at both meetings, follows:

Mr. Rodney Fewings	Cranfield University
Dott. Alberto Milotti	Università Commerciale Luigi Bocconi
Mr. Vincenzo de Luca	Consigliere Diplomatico, Ministro dei Transporti
Mr. Alfredo Roma	Chairman, Ente Nazionale per l'Aviazione Civile (ENAC)
Mr. Pierluigi di Palma	Direttore Generale, Ente Nazionale per l'Aviazione Civile
Com.te Dario Romagnoli	Ente Nazionale per l'Aviazione Civile
Dr. Santino Ciamiello	Direttore, Ente Nazionale di Assistenza al Volo
Mr. Carlo Griselli	President, Assoclearance
Mr. Vittorio Fanti	Direttore Generale, Società Esercizi Aeroportuali spa
Ing. Alberto Soldani	Direttore, Società Esercizi Aeroportuali spa
Ing. Paolo Sordi	Coordinamento Scali, Società Esercizi Aeroportuali spa
Dr.ssa Maria Luisa Geronimi	Società Esercizi Aeroportuali spa
Mr. Giovanni Biondelli	Società Esercizi Aeroportuali spa

In addition, a short meeting was held on the 27th June with Mr Renato Aggio (General Manager, United Airlines Cargo) who is the Airline Operators Committee (AOC) representative at Milan Malpensa Airport.

A1.2 Synopsis of the Rome / Milan meetings

It was stated that the approach of the Italian Government should be considered flexible whilst taking into account the importance of reducing noise problems to the population. The implementation of the environmental measures started before the transfer of flights. The period of progressive introduction has allowed the opportunity to adapt. There was strong agreement between the Transport and Environment Ministries that the model should be adopted according to the reality of airport operations.

Two months of trials have produced some delays as expected but no particular problems. Noise levels are being monitored on a continual basis and fine-tuning of procedures is being examined with a view of improving operational efficiency while keeping aircraft noise levels within agreed limits. The noise contours had been agreed by local communities, initially simulated using the Integrated Noise Model (INM) and now being tested in real life. (Note that copies of such signed agreements were submitted in addition to documents listed in Section 2)

It was agreed that questions had been raised by the airlines, prior to the transfer of flights from Linate to Malpensa, that the environmental measures would have an impact on capacity, but so far there has been no problem.

Operation of the Linate / Malpensa airport system is driven by a number of factors. Firstly, by the overall system capacity. Secondly, by the decision to develop Malpensa as a 'hub' airport.

Taking the first point, the present constraint is the capacity of Area Air Traffic Control for the Linate and Malpensa (but not Bergamo) airport system. At present this has a nominal capacity of 83 aircraft movements per hour. The declared capacity at Malpensa has been set at 70 aircraft movements per hour which leaves a balance of 13 aircraft movements per hour for Linate. There are of course delays but not all attributable to airport operations and constraints. It is intended to introduce new procedures that will reduce airport-related delays by 60% while still keeping within the constraints of noise limits.

However, from 18th May this year four upper airspace sectors have been moved to the Rome Area Control Centre and the introduction of a new control position may increase area capacity by 7%. A new operational room is due to be open next year with a further increase in capacity of about 20%. Consequently, Area ATC will no longer be a constraint and between 90 and 95 Malpensa aircraft operations per hour would be possible.

As far as ATC operations on and in the vicinity of Malpensa are concerned, procedures are being introduced that have been used with some success in the United States (APATSI) but not to any degree elsewhere in Europe. The runways are relatively close together but are being operated as independent parallel arrivals and departures, that is, if the environmental procedures and weather conditions allow, two aircraft can land 'simultaneously' (actually, staggered) on runways 35L and 35R. Note that there is a minimum radar separation of 3nm between the aircraft. Rigorous missed approach procedures are in place but rarely used. Likewise, 'simultaneous' departures have to turn left if on 35L and right if on 35R. There are plans to introduce a Surface Movement Guidance System (ground movement radar) which will improve the efficiency and safety of low visibility and night operations. It is also planned to initiate an apron management planning system.

The new control tower, located to the south of Terminal 1, is now fully operational. The entire length of both runways is clearly visible, as is the apron area of Terminal 1. Less visible is that of Terminal 2 being some 3000 metres to the north of the tower. CCTV is being used to enhance the views of the apron area although not suitable for night and low visibility operations.

Arrivals from North America are subject to delays as at present it is difficult to handle 10 wide-bodied aircraft at one time. Present punctuality for these operations is about 75%, rarely below 50%. There are plans in hand to increase the number of stands (although not a major constraint at present) by between 10 and 15 by the end of the year (with an ultimate total of between 150 and 160 available stands) and also to construct a high-speed turn-off for runway 35L. Additional taxiway links are also planned, in particular, a new link between Terminal 1 and Runway 35R.

This will allow departures from Terminal 1 to avoid crossing the active arrival runway 35L while transiting to 35R. It is also planned to construct a new pier for Terminal 1. In the long term a site for a third runway has been located to the south of the airport. However, the political and environmental problems are such that the construction of a third runway is extremely unlikely.

Aircraft movements at Linate and Malpensa have increased by over 40% during a period of two years and this rate of increase is expected to continue at least for another two years. Data was submitted showing the demand for slots at Malpensa for Summer and Winter 2000 seasons. During the Summer period 11th to 17th September (2000) projected daily demand ranges from 759 to 907 movements / day with a peak hourly of 70 movements per hour (the declared capacity). During the Winter period 12th to 18th March (2001) projected daily demand ranges from 810 to 942 movements / day with a peak hourly demand of 66 movements / hour (less than the declared capacity). Therefore, there are periods, although limited and for no more than one hour, when the airport will be operating at or near the declared capacity during the next 12 months.

As far as the airlines are concerned both airports (Linate and Malpensa) are presently dominated by Alitalia. Linate (primarily because of traffic distribution rules) is used by Alitalia for point to point traffic whereas Malpensa is seen by Alitalia as being a hub with long-haul flights feeding short / medium haul flights and vice versa. For geographical reasons, long-haul inter-continental services are concentrated at Malpensa whereas Rome is being developed as a hub for short and medium-haul Mediterranean regional services.

SEA considered that Malpensa should be seen as having hub potential for all airlines. For example, Air Europe uses Milan as charter hub whereas Air One uses Linate as hub. There is a significant proportion of transfer passengers and the average load factor at Malpensa is in excess of 80%. The traffic distribution rules resulted in 50 flights per day being moved from Linate to Malpensa, equivalent to just over 1,000,000 passengers per annum. Terminal 2 at Malpensa is primarily used for charter operations (no transfer) and other point to point operations. Passenger throughput in Terminal 2 is in the order of 2,500,000 passengers per annum. Scheduled carriers mostly use Terminal 1 and additional flights are being sought by both existing and new airlines for both the peaks and the troughs.

At present there are two distinct traffic peaks or 'waves' both for arrivals and departures. For example, on June 12th this year the arrival peaks were between 0600 ~ 0700 and 1600 ~ 1700, departure peaks were between 0800 ~ 0900 and 1800 ~ 1900. There is some indication that a third 'wave' may be developing in the middle of the day. The morning peak has a different traffic mix from that in the late afternoon.

Testing is still being undertaken of different scenarios with the aim of balances the use of different ATC procedures (and therefore potential capacity and other operational benefits) with minimising the impact of noise. A number of complaints have been made by the airlines. These include take-off weight limitations (impact on aircraft payload and range), changes to departure routes (re-planning of flight management systems) and other software changes because of restrictions on aircraft performance. There has also been some concern (with the exception of US airlines) about the introduction of noise abatement procedures at 1000ft instead of 1500ft. This procedure has now been relaxed to examine the impact on noise levels.

The last five years traffic data was requested for Bergamo, Linate and Malpensa. SEA promised that this data would be forwarded to the Consultants.

A1.3 Meeting with Mr Renato Aggio

A short meeting was held with Mr Aggio who is the Airline Operators Committee representative at Malpensa Airport.

Annex 2 Surface Access

A2.1 Road accessibility

A2.1.1 Introduction

The average access time to Milan airports is quite good in normal traffic condition. The main problem is the road congestion which increases the journey time, particularly for the East and West Rings of Milan and in peak hours.

In normal traffic conditions, the average access time by road from the cities of Lombardy with more than 10,000 inhabitants for each airport is:

Milan Linate:	30 minutes
Bergamo Orio al Serio:	38 minutes
Milan Malpensa:	44 minutes

Linate is the more accessible airport, because of its contiguity to the most populated area of the region. The same is for Bergamo, which is located in a barycentric position towards the region. Malpensa is reachable on the average in less than ¾ of an hour.

A2.1.2 Malpensa

The airport is currently linked to the A8 motorway (Milan-Varese) through the National Road n. 336. This is a two lane road for each direction, from the motorway turn-off of Busto Arsizio and it links the two Malpensa Terminal also with the National Road n. 527 in Lonate Pozzolo.

This road was completed the October 23rd of 1998 on the occasion of the opening of Malpensa 2000.

A2.1.3 Projects and interventions to improve Malpensa road accessibility

The road accessibility system to Malpensa will cost about 620 millions of Euros, and it will be an opportunity to improve the mobility of all the Lombardy. The agreement was signed in summer 1998 among Lombardy Region, ANAS and SEA. It states the planning terms of the road accessibility system to the airport: the Lombardy Region has co-ordination duties with local bodies while ANAS has technical duties superintending the preliminary stage of the project. SEA will play an active role in the planning.

In the next years it is foreseen the completion of the feasibility and assessment studies for these projects:

1	New motorway in the North area of Milan (Itinerario viabilistico pedemontano)	1.900 Million €
2	New link Malpensa airport – S.S. 527 – Motorway A4 (in Boffalora) – S.S. 11	180 Million €
3	Link Motorway A8/26 and SS 336	13 Million €
4	Link SS 11 - SS 494 – West Ring of Milan	207 Million €
5	New route of SS 341 Turbigo-Samarate	77 Million €
6	New route of SS 33 Rho-Gallarate	72 Million €
7	New route of SS 342 in Solbiate, Olgiate Comasco and Vedano Olona	28 Million €
8	New route of SS 494 in Abbiategrasso e new bridge over Ticino river	41 Million €

At the present the main infrastructure projects concerning Malpensa road accessibility carried on are:

- Upgrading of A8 motorway from Milan Fiorenza to Gallarate: this project was planned to improve traffic absorbing capacity of A8 motorway. It was completed the October 13th of 1999, before the coming into force of 1999-2000 winter schedule. This intervention mainly consisted in the fourth lane between Fiorenza and Lainate (XX km) and in the third lane from Lainate to Gallarate (XX km). Other realisation were the continue emergency lane for all this section, the "new jersey" traffic divider and 30 new emergency lay-by.

- New link with the motorway A4 Milan – Turin: in August 1997 an agreement was signed among Lombardy Region, ANAS and SEA to plan the new link between Malpensa airport and A4 motorway (Milan-Turin). The project consist of an 18 kilometres new road which could grant a new access to the airport from South. The agreement foresees the terms of definitive planning, with the Environmental Impact Assessment, which has to be ready.

- New motorway in the North area of Milan (Itinerario viabilistico pedemontano): this is a new integrated motorway system which was planned to solve part of the congestion problem in the North Milan area and to satisfy mobility generated by Malpensa airport from the East Lombardy. This new motorway is planned to develop in the piedmont axis from Varese to Bergamo. Nowadays this project integrates existent road elements, both motorways and ordinary, with new motorway sections, particularly:
  - Varese by-pass system completion from North to South West; it will link directly the city to the A8 motorway to Milan;
  - Como South Ring which will link National Road n. 342 to A8 and A9 motorways;
  - The motorway axis which is aimed to link the West catchment area of Milan (Malpensa, Gallarate, Busto Arsizio and Legnano) with the East one (Monza, Vimercate, Bergamo). The new route will start from the "link road of Gallarate" (between the A8 motorway and the National Road n. 336 to Malpensa), and it will end getting into the A4 motorway Milan-Venice and on the South Ring of Bergamo now under construction.

- New link between the motorway A8/26 and the National Road S.S. 336: this project is actually in the preliminary step. It is finalised to improve the link between the A8 motorway and Malpensa airport through the National Road n. 336.

A2.1.4 Linate

Linate airport is 8 km far from the centre of Milan. It is reachable directly by road from the East Ring of Milan (Linate exit). The airport is linked to the Provincial Road n. 14 "Rivoltana" which allows the access to the airport from East. The main problem consists in the Ring heavy traffic, which increases the access time in the peak hours.

A2.1.5 Bergamo Orio al Serio

The airport is 5 km far from the centre of the city and 45 km from Milan. It is 2 km from the Seriate exit on the A4 Motorway (Milan – Venice).

The motorway grants an easy accessibility to the airports, but, as far as Linate, the heavy traffic on Milan-Bergamo route increases access time to the airport. The main projects on this infrastructure (fourth lane, new tunnel between Fiorenza and Agrate) and the new highway in the North area of Milan (Itinerario viabilistico pedemontano) could improve in future the accessibility from Varese, Como, Milan and Lecco.

A2.2 Public transport (bus)

Among the public transport services by road we have considered bus services from the three airports. Booking services, rent minibus and services from/to hotels are excluded from these such as taxi services.

The market share assigned to public transport by road is more or less 20%.

A2.2.1 Malpensa

Public transport by road could be considered satisfactory both in terms of destinations (36) and of frequency. This type of service is complementary to the rail one towards Milan. In the other cases it links several Lombardy and Piedmont main towns. The great part of these services is done with comfortable GT coaches. The route is mainly through motorway.

Main destinations served are:

Final Destination	Main intermediate stops	Number of intermediate stops	Price (Euro)	Daily frequency	Travelling time
Milan Central Station		0	6,71	52	55 min.
Linate	Gobba (subw.M2)	1	9,30	10	75 min.
Varese		0	5,16	3	45 min.
Borgomanero		0	2,17	1	25 min.
Genoa	Casale Monferrato	3	15,50	2	165 min.
Menaggio	Como	5	12,14	1	115 min.
Novara		3	6,71	4	55 min.
Pavia		4	9,81	4	95 min.
Turin		2	15,50	3	120 min.
Lugano (CH)	Chiasso	1	31,00	5	60 min.
Verbania	Stresa; Arona	5	19,91	1	60 min.

The price in the table refers to the final destination. The frequency indicated is for each direction in a working day. Travelling times are the one reported in the official schedule for final destination. There are two other services, for Brescia and Piacenza, which are not included in the table because it is requested a mandatory booking and so they are not continue services.

The great part of bus services connects both Malpensa terminals. They are linked also by a free shuttle bus every ten minutes.

A2.2.2 Linate

Linate airport is linked to Milan with urban public transport services. Bus number 73 links the airport to S. Babila square (town centre) in 25 minutes every 10 minutes from 06.00 till 00.57. The ticket is the urban one, which costs 1.500 ITL (0,77 €).

The airport is also linked to the Central Station every 30 minutes. Travel time is 25 minutes and the fare 5.000 ITL (2,58 €).

A2.2.3 Bergamo Orio al Serio

Orio al Serio airport is linked with the Central Station of Milan by nine daily bus services from Monday to Friday. Travel time is 60 minutes and the ticket costs 13.000 ITL (6,71€). Twice a day (once on Sunday) there is a departure to Bergamo Bus Station and from there to Linate. The costs 15.000 ITL (7,75€).

A2.3 Rail accessibility

A2.3.1 Actual situation

The only airport directly linked to city by rail is Malpensa. Even future projects consider only this airport, not considering Linate and Bergamo integration in the rail network feasible or necessary.

All main European airports are strategically linked to the rail network, particularly to the High Speed network. In fact the HS train could represent a feeder service to the air transport on short and medium distance. Under this point of view Malpensa is an exception. Its geographic position has not let the airport to integrate itself with the Italian network: the nearest one is planned to develop 30 km South from the airport (Turin-Milan).

Malpensa is actually linked to Milan (Cadorna FNM Station) in 40 minutes. This service is done with two couples of trains per hour (every 30 minutes) for each direction. The first train starts from Milan at 5.00 AM, the last one at 11.10 PM. In the opposite direction the service is available from 6.00 AM to 1.30 AM. Trains stop both in Bovisa Station, where it is possible to take the urban underground railway (Passante Ferroviario), and in Saronno, an important node of FNM network from where it is possible to interchange to Como, Varese and Novara. On the occasion of the main fairs the train stops also in "Milan Bullona-Fiera" 500 metres from the fair entrance. The rail accessibility to Malpensa is good from Milan and the towns, which belongs to Milan, Varese and Como provinces, located along the rail track. The situation for the rest of the region is not so good, particularly because the lack of interchange between FS and FNM networks.

Malpensa airport is indirectly linked also to the FS network at Gallarate Station with a bus once an hour. This link is not considered to be competitive because of the low frequency, its lack of comfort for the passengers with luggage and the strong concurrency done by the bus direct link to Milan Central Station (Malpensa Shuttle).

A2.3.2 New projects and future accessibility

These project (planning or under construction) will increase rail accessibility to the airport.

Passante ferroviario: it is necessary both for a new Regional Rail Service (Servizio Ferroviario Regionale), and with the city requirements of integration of the rail network with the public transport city network (three subway lines M1, M2, M3). In 2002 Malpensa will be directly reachable from Bergamo, while in 2005, at the end of the last works, from Lodi and Pavia with only a train change in Bovisa Station. With the recent Institutional Agreement signed between the State and Lombardy Region in February 1999 there is an agreement for the realisation of an integrated system of both road and rail accessibility to Malpensa. In this agreement there is financial covering of these interventions for an amount of 150 Billion ITL (77.500 €) as stated in law number 194 of 98.

Gronda nord ferroviaria: This project is aimed to link directly Malpensa and Brescia, through Saronno, Seregno and Bergamo with the utilisation of existing sections for almost the entire route which at the present are not interconnected. These section are currently used for commuters traffic, with the exception of the Saronno-Seregno which is used daily only for a couple of freight trains. On the basis of a 1996 study, it would be possible to start a new service for passengers with few stops in the main nodes of the network. Actually the Saronno-Seregno section is not electrified, but works are in progress and they have to finish within the year. Costs are estimated in 50 billions ITL (25,8 million €).

Direct link between Malpensa and Milan Central Station (FS): There are three alternative solution which have to be assessed in terms of technical, economic e financial feasibility:

- "Bovisa" solution: the link could be done using the FNM line as far as Bovisa Station (actual Malpensa Express station) and from there realising a new siding to Central Station and FS network;
- "Gallarate" solution: the link could be done with the construction of new tracks from Malpensa rail Station (North side) to Gallarate and then following the Simplon line to Central Station;
- "HS" solution: the link could be done with the construction of new High Speed railway from Lugano to Milan, which is the extension of Swiss ALPTRANSIT project. One of the hypothesis currently studied could link this new railway with the airport and then to the Milan-Turin Italian High Speed railway.

New link FNM-FS in Novara: The reorganisation of Novara node will let to connect the FNM railway line Novara - Busto Arsizio - Malpensa to the new High Speed line from Turin to Milan. The technical planning of the node has been studied jointly by FS and FNM. The first intervention required is now the upgrading of the FNM line Novara – Busto, to allow the link to Malpensa. This new link will allow a freight service from Malpensa Cargo City and the Novara Boschetto Terminal, and a passengers service from Piedmont region to the airport.

A2.4 Link between airports

In Lombardy there are only two bus lines with connect the airports:

Linate – Malpensa
Linate - Bergamo Orio al Serio

This supply lack could reflect the absence of a moving demand among airports.

The alternatives to the public transport by road are mainly taxis, car pooling (not yet used) and car rental.

The table below summarises possibilities and costs of an inter-airport moving with a small-medium hired car. Some companies supply particular conditions to transfer connection between Linate and Malpensa. Particularly some of them don't impute return charges. Other companies have signed agreements with airlines and offer reduction in fares.

Car Rent	BGY-MXP	MXP-LIN	LIN-BGY
AVIS	77,9 €	92,9 €	113,6 €
EUROPCAR	60,9 €	66,1 €	72,8 €
HERTZ	51,6 € (with reservation)	33,6 €	113,6 €
MAGGIORE-BUDGET	59,4 €+ 31€ (drop off)	58,9€ (35,6 with Alitalia ticket)	86,0 €
SIXT	38,7 €	40,3 €	40,3 +36,1 € (drop off)
TIRRENO	non admitted	56,8 € (more than 3 h.) 31 € (less than 3 h.)	non admitted
ITALY BY CAR	non admitted	43,9 €	non admitted

Annex 3.1 Traffic Forecasts to 2003 ~ Base Case

	MXP				LIN				MIL (excluding BGY)			
	Domestic	Int.	transit	Total	Domestic	Int.	Transit	Total	Domestic	Int.		Total
1994	249,790	2,981,661	447,957	3,679,408	4,436,323	5,588,763	109,221	10,134,307	4,686,113	8,570,424	557,178	13,813,715
1995	262,801	3,150,914	478,420	3,892,135	4,561,264	6,148,238	117,557	10,827,059	4,824,065	9,299,152	595,977	14,719,194
1996	245,596	3,125,632	431,925	3,803,153	5,612,553	6,897,146	53,747	12,563,446	5,858,149	10,022,778	485,672	16,366,599
1997	236,247	3,249,325	435,333	3,920,905	6,583,823	7,677,793	9,529	14,271,145	6,820,070	10,927,118	444,862	18,192,050
1998	966,509	4,577,751	375,332	5,919,592	6,238,763	7,370,544	2,442	13,611,749	7,205,272	11,948,295	377,774	19,531,341
1999	***6,173,783***	***10,453,146***	***287,546***	16,914,475	***3,338,993***	***3,211,201***	***3,277***	6,553,471	9,512,777	13,664,346	290,823	23,467,946
2000	*6,933,681*	*11,674,998*	*258,480*	*18,867,159*	*3,504,108*	*3,369,996*	*3,439*	*6,877,542*	*10,437,789*	*15,044,994*	*261,919*	*25,744,701*
2001	*7,627,049*	*13,075,998*	*258,480*	*20,961,527*	*3,679,313*	*3,538,495*	*3,611*	*7,221,419*	*11,306,362*	*16,614,493*	*262,091*	*28,182,946*
2002	*8,237,213*	*14,383,598*	*258,480*	*22,879,291*	*3,863,279*	*3,538,495*	*3,611*	*7,405,385*	*12,100,492*	*17,922,093*	*262,091*	*30,284,675*
2003	*8,813,818*	*15,534,285*	*258,480*	*24,606,583*	*4,056,443*	*3,538,495*	*3,611*	*7,598,549*	*12,870,260*	*19,072,781*	*262,091*	*32,205,132*

Base Case	MXP				LIN				MIL (excluding BGY)			
	Domestic	Int.	transit	Total	Domestic	Int.	Transit	Total	Domestic	Int.		Total
1994												
1995	5%	6%	7%	6%	3%	10%	8%	7%	3%	9%	7%	7%
1996	-7%	-1%	-10%	-2%	23%	12%	-54%	16%	21%	8%	-19%	11%
1997	-4%	4%	1%	3%	17%	11%	-82%	14%	16%	9%	-8%	11%
1998	309%	41%	-14%	51%	-5%	-4%	-74%	-5%	6%	9%	-15%	7%
1999	539%	128%	-23%	186%	-46%	-56%	34%	-52%	32%	14%	-23%	20%
2000	12%	12%	-10%	12%	5%	5%	5%	5%	10%	10%	-10%	10%
2001	**10.0%**	**12.0%**	**0.0%**	11.1%	**5.0%**	**5.0%**	**5.0%**	5.0%	8.3%	10.4%	0.1%	9.5%
2002	**8.0%**	**10.0%**	**0.0%**	9.1%	**5.0%**	**0.0%**	**0.0%**	2.5%	7.0%	7.9%	0.0%	7.5%
2003	**7.0%**	**8.0%**	**0.0%**	7.5%	**5.0%**	**0.0%**	**0.0%**	2.6%	6.4%	6.4%	0.0%	6.3%

Annex 3.2 Traffic Forecasts to 2003 ~Low Case

	MXP				LIN				MIL (excluding BGY)			
	Domestic	Int.	transit	Total	Domestic	Int.	Transit	Total	Domestic	Int.		Total
1994	249,790	2,981,661	447,957	3,679,408	4,436,323	5,588,763	109,221	10,134,307	4,686,113	8,570,424	557,178	13,813,715
1995	262,801	3,150,914	478,420	3,892,135	4,561,264	6,148,238	117,557	10,827,059	4,824,065	9,299,152	595,977	14,719,194
1996	245,596	3,125,632	431,925	3,803,153	5,612,553	6,897,146	53,747	12,563,446	5,858,149	10,022,778	485,672	16,366,599
1997	236,247	3,249,325	435,333	3,920,905	6,583,823	7,677,793	9,529	14,271,145	6,820,070	10,927,118	444,862	18,192,050
1998	966,509	4,577,751	375,332	5,919,592	6,238,763	7,370,544	2,442	13,611,749	7,205,272	11,948,295	377,774	19,531,341
1999	***6,173,783***	***10,453,146***	***287,546***	16,914,475	***3,338,993***	***3,211,201***	***3,277***	6,553,471	9,512,777	13,664,346	290,823	23,467,946
2000	*6,933,681*	*11,674,998*	*258,480*	*18,867,159*	*3,504,108*	*3,369,996*	*3,439*	*6,877,542*	*10,437,789*	*15,044,994*	*261,919*	*25,744,701*
2001	*7,523,044*	*12,900,873*	*254,603*	*20,678,519*	*3,626,751*	*3,487,945*	*3,559*	*7,118,256*	*11,149,795*	*16,388,818*	*258,162*	*27,796,775*
2002	*8,012,042*	*13,997,447*	*250,784*	*22,260,272*	*3,753,688*	*3,435,626*	*3,506*	*7,192,820*	*11,765,729*	*17,433,073*	*254,290*	*29,453,092*
2003	*8,452,704*	*14,907,281*	*247,022*	*23,607,007*	*3,885,067*	*3,384,092*	*3,453*	*7,272,612*	*12,337,771*	*18,291,373*	*250,475*	*30,879,619*

Low Case	MXP				LIN				MIL (excluding BGY)			
	Domestic	Int.	Transit	Total	Domestic	Int.	Transit	Total	Domestic	Int.	Transit	Total
1994												
1995	5%	6%	7%	6%	3%	10%	8%	7%	3%	9%	7%	7%
1996	-7%	-1%	-10%	-2%	23%	12%	-54%	16%	21%	8%	-19%	11%
1997	-4%	4%	1%	3%	17%	11%	-82%	14%	16%	9%	-8%	11%
1998	309%	41%	-14%	51%	-5%	-4%	-74%	-5%	6%	9%	-15%	7%
1999	539%	128%	-23%	186%	-46%	-56%	34%	-52%	32%	14%	-23%	20%
2000	12%	12%	-10%	12%	5%	5%	5%	5%	10%	10%	-10%	10%
2001	**8.5%**	**10.5%**	**-1.5%**	9.6%	**3.5%**	**3.5%**	**3.5%**	3.5%	6.8%	8.9%	-1.4%	8.0%
2002	**6.5%**	**8.5%**	**-1.5%**	7.6%	**3.5%**	**-1.5%**	**-1.5%**	1.0%	5.5%	6.4%	-1.5%	6.0%
2003	**5.5%**	**6.5%**	**-1.5%**	6.0%	**3.5%**	**-1.5%**	**-1.5%**	1.1%	4.9%	4.9%	-1.5%	4.8%

Annex 3.3 Traffic Forecasts to 2003 ~ High Case

	MXP				LIN				MIL (excluding BGY)			
	Domestic	Int.	Transit	Total	Domestic	Int.	Transit	Total	Domestic	Int.	Transit	Total
1994	249,790	2,981,661	447,957	3,679,408	4,436,323	5,588,763	109,221	10,134,307	4,686,113	8,570,424	557,178	13,813,715
1995	262,801	3,150,914	478,420	3,892,135	4,561,264	6,148,238	117,557	10,827,059	4,824,065	9,299,152	595,977	14,719,194
1996	245,596	3,125,632	431,925	3,803,153	5,612,553	6,897,146	53,747	12,563,446	5,858,149	10,022,778	485,672	16,366,599
1997	236,247	3,249,325	435,333	3,920,905	6,583,823	7,677,793	9,529	14,271,145	6,820,070	10,927,118	444,862	18,192,050
1998	966,509	4,577,751	375,332	5,919,592	6,238,763	7,370,544	2,442	13,611,749	7,205,272	11,948,295	377,774	19,531,341
1999	***6,173,783***	***10,453,146***	***287,546***	16,914,475	***3,338,993***	***3,211,201***	***3,277***	6,553,471	9,512,777	13,664,346	290,823	23,467,946
2000	*6,933,681*	*11,674,998*	*258,480*	*18,867,159*	*3,504,108*	*3,369,996*	*3,439*	*6,877,542*	*10,437,789*	*15,044,994*	*261,919*	*25,744,701*
2001	*7,731,054*	*13,251,123*	*262,357*	*21,244,534*	*3,731,875*	*3,589,045*	*3,662*	*7,324,582*	*11,462,929*	*16,840,168*	*266,020*	*28,569,116*
2002	*8,465,504*	*14,775,002*	*266,293*	*23,506,799*	*3,974,446*	*3,642,881*	*3,717*	*7,621,045*	*12,439,951*	*18,417,883*	*270,010*	*31,127,844*
2003	*9,185,072*	*16,178,627*	*270,287*	*25,633,986*	*4,232,786*	*3,697,524*	*3,773*	*7,934,083*	*13,417,858*	*19,876,151*	*274,060*	*33,568,069*

High Case	MXP				LIN				MIL (excluding BGY)			
	Domestic	Int.	Transit	Total	Domestic	Int.	Transit	Total	Domestic	Int.	Transit	Total
1994												
1995	5%	6%	7%	6%	3%	10%	8%	7%	3%	9%	7%	7%
1996	-7%	-1%	-10%	-2%	23%	12%	-54%	16%	21%	8%	-19%	11%
1997	-4%	4%	1%	3%	17%	11%	-82%	14%	16%	9%	-8%	11%
1998	309%	41%	-14%	51%	-5%	-4%	-74%	-5%	6%	9%	-15%	7%
1999	539%	128%	-23%	186%	-46%	-56%	34%	-52%	32%	14%	-23%	20%
2000	12%	12%	-10%	12%	5%	5%	5%	5%	10%	10%	-10%	10%
2001	**11.5%**	**13.5%**	**1.5%**	12.6%	**6.5%**	**6.5%**	**6.5%**	6.5%	9.8%	11.9%	1.6%	11.0%
2002	**9.5%**	**11.5%**	**1.5%**	10.6%	**6.5%**	**1.5%**	**1.5%**	4.0%	8.5%	9.4%	1.5%	9.0%
2003	**8.5%**	**9.5%**	**1.5%**	9.0%	**6.5%**	**1.5%**	**1.5%**	4.1%	7.9%	7.9%	1.5%	7.8%

Annex 4 Traffic Data for Principal European Airports

DATI DI TRAFFICO SUI PRINCIPALI AEROPORTI EUROPEI

PERIODO: Gennaio - Aprile 2000

(Fonte: ACI - Rapid Data Exchange Program)

		MOVIMENTI A/M	VAR. % 2000/99
1	LONDON	270.635	4,6
	Gatwick	*76.476*	*1,7*
	Heathrow	*150.021*	*4,0*
	Stansted	*44.138*	*12,4*
2	PARIS	243.636	9,6
	Charles de Gaulle	*162.855*	*14,3*
	Orly	*80.781*	*1,1*
3	FRANKFURT, DE	139.510	6,5
4	AMSTERDAM, NL	132.519	9,8
5	MADRID, ES	113.593	22,1
6	STOCHOLM	98.729	4,6
	Arlanda	*89.592*	*4,9*
	Bromma	*9.137*	*2,1*
7	COPENHAGEN, DK	99.568	5,2
8	BRUSSELS, BE	98.571	7,3
9	MILANO	97.661	13,2
	Malpensa	75.365	*18,4*
	Linate	22.296	*(1,4)*
10	ZURICH, CH	—	
11	ROMA	87.811	4,9
	Fiumicino	*83.689*	*4,3*
	Ciampino	*4.122*	*19,7*
12	MUNICH, DE	90.680	7,4
13	BARCELONA, ES	78.671	10,5
14	DUSSELDORF, DE		
15	VIENNA, AT	56.639	7,3
16	HELSINKI, FI	52.319	10,0
17	MANCHESTER, GB	51.478	3,7
18	NICE, FR	45.523	9,7
19	PALMA DE MALLORCA, ES	43.175	12,8
20	GRAN CANARIA, ES	32.897	5,3
21	LISBON, PT		
22	MALAGA, ES	23.893	20,1
23	BERLIN, DE	58.552	6,5
	TOTALE	1.916.060	8,4

		PASSEGGERI - (.000) -	VAR. % 2000/99	PAX. PER MOV.
1	LONDON	31.347	5,6	116
	Gatwick	*8.623*	*2,5*	*113*
	Heathrow	*19.639*	*3,7*	*131*
	Stansted	*3.085*	*32,7*	*70*
2	PARIS	22.693	7,2	93
	Charles de Gaulle	*14.345*	*10,6*	*88*
	Orly	*8.348*	*1,7*	*103*
3	FRANKFURT, DE	14.469	6,9	104
4	AMSTERDAM, NL	11.458	8,7	86
5	MADRID, ES	9.836	16,8	87
6	ROMA	7.538	1,5	86
	Fiumicino	*7.333*	*1,5*	*88*
	Ciampino	*205*	*1,7*	*50*
7	MILANO	7.940	16,1	81
	Malpensa	*5.871*	*23,6*	*78*
	Linate	*2.069*	*(0,9)*	*93*
8	MUNICH, DE	6.774	8,3	75
9	ZURICH, CH			#DIV/0!
10	STOCHOLM	6.015	8,0	61
	Arlanda	*5.673*	*8,0*	*63*
	Bromma	*342*	*6,9*	*37*
11	BRUSSELS, BE	6.250	9,9	63
12	BARCELONA, ES	5.780	12,9	73
13	COPENHAGEN, DK	5.494	4,9	55
14	MANCHESTER, GB	4.621	2,5	90
15	DUSSELDORF, DE			#DIV/0!
16	PALMA DE MALLORCA, ES	4.011	4,4	93
17	HELSINKI, FI	3.256	11,1	62
18	GRAN CANARIA, ES	3.238	2,2	98
19	VIENNA, AT	3.291	4,7	58
20	NICE, FR	2.701	11,8	59
21	LISBON, PT			#DIV/0!
22	MALAGA, ES	2.589	15,9	108
23	BERLIN, DE	3.914	8,7	67
	TOTALE	163.215	7,9	85

		MERCE (TONN.)	VAR. % 2000/99
1	LONDON	579.058	8,5
	Gatwick	*104.410*	*17,1*
	Heathrow	*423.704*	*11,2*
	Stansted	*50.944*	*(19,7)*
2	FRANKFURT, DE	481.240	11,8
3	AMSTERDAM, NL	399.390	2,6
4	BRUSSELS, BE	209.772	4,9
5	MADRID, ES	100.349	11,2
6	MILANO	97.876	20,5
	Malpensa	91.683	*25,4*
	Linate	6.193	*(23,8)*
7	ROMA	60.201	27,4
	Fiumicino	*55.494*	*28,7*
	Ciampino	*4.707*	*14,6*
8	MUNICH, DE	41.040	18,4
9	VIENNA, AT	40.243	12,2
10	STOCHOLM Arlanda	37.895	6,2
11	MANCHESTER, GB	33.442	10,2
12	LISBON, PT		
13	HELSINKI, FI	31.100	4,2
14	BARCELONA, ES	29.502	17,8
15	DUSSELDORF, DE		
16	GRAN CANARIA, ES	16.002	5,1
17	PALMA DE MALLORCA, ES	7.136	(4,5)
18	NICE, FR	5.549	6,8
19	MALAGA, ES	3.134	5,7
20	BERLIN, DE	8.560	3,1
	TOTALE	2.181.489	0,0

Note - Non sono disponibili i dati relativi al traffico merce di Copenhagen, Zurigo, Colonia e Parigi,

Annex 5 Traffic Data for Milan Airport System (June 2000)

JUNE

Sistema Aeroportuale - Analisi dei dati di traffico del mese di GIUGNO 2000 — 26 giu 2000 ore 10:34

Giorno	Movimenti di Linea Arr.	Movimenti di Linea Part.	Movimenti Charter Arr.	Movimenti Charter Part.	Totale Mov.	Passeggeri di Linea Arr.	Passeggeri di Linea Part.	Passeggeri Charter Arr.	Passeggeri Charter Part.	Passeggeri Totale Arr.	Passeggeri Totale Part.	Trans. diretto	Totale Pax	Merce Kg Arrivo	Merce Kg Partenza	Merce Kg Totale
1 GIO	449	444	6	13	912	36211	36307	512	1579	36723	37886	450	75059	490214	668703	1158917
2 VEN	444	445	8	8	905	31688	36163	674	1271	32362	37434	579	70375	280458	321069	601527
3 SAB	372	374	23	26	795	30249	34762	2346	3666	32595	38428	783	71806	500257	501136	1001393
4 DOM	394	394	46	45	879	38193	39347	5670	6200	43863	45547	527	89937	481749	372272	854021
5 LUN	451	452	57	52	1.012	38104	38027	6798	6491	44902	44518	594	90014	276168	480204	756372
6 MAR	441	446	16	16	919	33081	32003	2148	2025	35229	34028	550	69807	248707	494897	743604
7 MER	446	445	13	8	912	32874	33648	1582	988	34456	34636	96	69188	420614	537236	957850
8 GIO	453	448	4	5	910	34374	35897	529	593	34903	36490	344	71737	448030	502356	950386
9 VEN	442	447	7	11	907	37635	39306	932	1597	38567	40903	580	80050	263851	422500	686351
10 SAB	383	382	28	32	825	35414	36738	2884	4526	38298	41264	736	80298	508625	444701	953326
11 DOM	402	400	48	50	900	37924	35633	6016	7695	43940	43328	625	87893	324064	516275	840339
12 LUN	448	446	57	54	1.005	38715	37745	6445	6881	45160	44626	629	90415	439292	420939	860231
13 MAR	439	438	16	19	912	33007	35428	1949	2878	34956	38306	570	73832	290282	387797	678079
14 MER	443	440	14	13	910	34071	36290	1885	1913	35956	38203	147	74306	265293	548511	813804
15 GIO	446	445	11	9	911	35798	37467	1212	1235	37010	38702	394	76106	496067	446120	942187
16 VEN	449	454	11	14	928	37708	41682	1285	1723	38993	43405	403	82801	326034	455438	781472
17 SAB	380	380	32	35	827	33534	37468	3080	5640	36614	43108	789	80511	370686	548156	918842
18 DOM	407	400	51	54	912	40303	39158	7147	8765	47450	47923	512	95885	363255	338496	701751
19 LUN	344	347	45	49	785	31741	32325	3754	7077	35495	39402	533	75430	209537	262116	471653
20 MAR	457	450	32	30	969	36061	36484	3305	4086	39366	40570	658	80594	311382	565961	877343
21 MER	443	442	15	10	910	37427	35598	2066	1416	39493	37014	108	76615	458739	468869	927608
22 GIO	443	446	11	10	910	36218	37567	1216	1142	37434	38709	608	76751	514412	526697	1041109
23 VEN	453	450	15	16	934	36855	40857	1471	2191	38326	43048	361	81735	356555	422713	779268
24 SAB	391	386	36	40	853	33649	38490	4685	6004	38334	44494	961	83789	479328	449634	928962
25 DOM	404	400	54	52	910	40848	40211	7209	8378	48057	48589	503	97149	313096	491811	804907
TOTALI	10624	10601	656	671	22.552	891682	924601	76800	95960	968482	1020561	13040	2002083	9436695	11594607	21031302
VALORI MEDI GIORNALIERI GIUGNO 2000	425	424	26	27	902	35667	36984	3072	3838	38739	40822	522	80083	377468	463784	841252
PROIEZIONE A FINE MESE	12749	12721	787	805	27.062	1070018	1109521	92160	115152	1162178	1224673	15648	2402500	11324034	13913528	25237562
CONSUNTIVO MESE DI GIUGNO 1999	11945	11930	805	815	25.495	929440	957147	83512	107650	1012952	1064797	16690	2094439	10449405	11752649	22202054
VARIAZIONE % DELLA PROIEZIONE 2000 RISPETTO AL CONSUNTIVO 1999	6,7	6,6	-2,2	-1,2	6,1	15,1	15,9	10,4	7,0	14,7	15,0	-6,2	14,7	8,4	18,4	13,7

CONFRONTO	PROIEZIONE: GIUGNO 2000	BUDGET GIUGNO 2000	% proiez. 2000: risp. al piano	CONSUNTIVO GIUGNO 1999	% proiezione 2000: su consuntivo 1999	variazione % 2000/1999: periodo 01/25 GIUGNO
TOTALE MOVIMENTI	27.062	26.673	1,5	25.495	6,1	6,3
TOTALE TONNELLAGGIO	2.050.469	2.026.357	1,2	1.888.766	8,6	9,2
TOTALE PASSEGGERI (*)	2.386.852	2.316.235	3,0	2.077.749	14,9	17,3
TOTALE MERCE	25.237.562	24.335.000	3,7	22.202.054	13,7	14,7

(*) Passeggeri arrivati + partiti

S.E.A./Pianificazione e Controllo

dati preliminari:

 Aeroporto di Malpensa - Analisi dei dati di traffico del mese di GIUGNO 2000 26 giu 2000 ore 10:34

Giorno	Numero Movimenti Aeromobili: di Linea Arr.	di Linea Part.	Charter Arr.	Charter Part.	Totale Mov.	Traffico Passeggeri: di Linea Arr.	di Linea Part.	Charter Arr.	Charter Part.	Totale Arr.	Totale Part.	Trans. diretto	Totale Pax	Merce: Kg Arrivo	Kg Partenza	Kg Totale
1 GIO	358	354	6	13	731	27614	27197	512	1579	28126	28776	450	57352	484460	660300	1144760
2 VEN	350	348	8	8	714	23905	26815	674	1271	24579	28086	579	53244	270642	312589	583231
3 SAB	307	304	23	26	660	25149	28039	2346	3666	27495	31705	783	59983	492625	494766	987391
4 DOM	321	327	45	45	738	30253	33057	5670	6200	35923	39257	527	75707	477753	370951	848704
5 LUN	358	359	56	52	825	29385	29413	6798	6491	36183	35904	594	72681	267911	475769	743680
6 MAR	348	352	16	16	732	24592	23551	2148	2025	26740	25576	550	52866	241792	486258	728050
7 MER	352	352	13	8	725	23979	24390	1582	988	25561	25378	96	51035	412759	528312	941071
8 GIO	358	354	4	5	721	25236	26460	529	593	25765	27053	344	53162	436869	493948	930817
9 VEN	347	351	7	11	716	28949	29391	932	1597	29881	30988	580	61449	255228	411314	666542
10 SAB	316	308	28	32	684	28729	28823	2884	4526	31613	33349	736	65698	501685	436020	937705
11 DOM	326	330	48	50	754	30431	29141	6016	7695	36447	36836	625	73908	322391	513687	836078
12 LUN	354	354	57	54	819	29272	29222	6445	6881	35717	36103	629	72449	432223	416779	849002
13 MAR	345	344	16	19	724	24732	26114	1949	2878	26681	28992	570	56243	279265	378973	658238
14 MER	348	345	14	13	720	25094	26490	1885	1913	26979	28403	147	55529	255428	539846	795274
15 GIO	352	349	11	9	721	26723	27339	1212	1235	27935	28574	394	56903	486238	438075	924313
16 VEN	352	355	11	14	732	29070	30718	1285	1723	30355	32441	403	63199	317692	447309	765001
17 SAB	311	307	32	35	685	27689	29360	3080	5640	30769	35000	789	66558	364257	543045	907302
18 DOM	329	327	51	54	761	32379	31987	7147	8765	39526	40752	512	80790	359429	333189	692618
19 LUN	246	251	45	49	591	21915	22848	3754	7077	25669	29925	533	56127	203780	259310	463090
20 MAR	357	351	32	30	770	27300	27197	3305	4086	30605	31283	658	62546	300938	557252	858190
21 MER	344	343	15	10	712	27987	25755	2066	1416	30053	27171	108	57332	447741	460784	908525
22 GIO	345	347	11	10	713	26426	27197	1216	1142	27642	28339	608	56589	502457	520019	1022476
23 VEN	353	349	15	16	733	28216	30245	1471	2191	29687	32436	361	62484	347047	416187	763234
24 SAB	318	310	36	39	703	27397	30013	4685	6004	32082	36017	961	69060	472961	444142	917103
25 DOM	324	326	54	52	756	32309	32683	7209	8378	39518	41061	503	81082	310455	488491	798946
TOTALI	8419	8397	654	670	18.140	684731	703445	76800	95960	761531	799405	13040	1573976	9244026	11427315	20671341
VALORI MEDI GIORNALIERI GIUGNO 2000	337	336	26	27	726	27389	28138	3072	3838	30461	31976	522	62959	369761	457093	826854
PROIEZIONE A FINE MESE	10103	10076	785	804	21.768	821677	844134	92160	115152	913837	959286	15648	1888771	11092831	13712778	24805609
CONSUNTIVO MESE DI GIUGNO 1999	8893	8878	762	773	19.306	635218	646967	81130	103035	716348	750002	16690	1483040	9423842	10796613	20220455
VARIAZIONE % DELLA PROIEZIONE 2000 RISPETTO AL CONSUNTIVO 1999	13,6	13,5	3,0	4,0	12,8	29,4	30,5	13,6	11,8	27,6	27,9	-6,2	27,4	17,7	27,0	22,7

CONFRONTO :	PROIEZIONE: GIUGNO 2000	BUDGET GIUGNO 2000	% proiez. 2000: risp. al piano	CONSUNTIVO GIUGNO 1999	% proiezione 2000: su consuntivo 1999	variazione % 2000/1999: periodo 01/25 GIUGNO
TOTALE MOVIMENTI	21.768	20.631	5,5	19.306	12,8	13,3
TOTALE TONNELLAGGIO	1.713.780	1.613.271	6,2	1.470.427	16,5	17,8
TOTALE PASSEGGERI (*)	1.873.123	1.688.556	10,9	1.466.350	27,7	32,4
TOTALE MERCE	24.805.609	22.430.000	10,6	20.220.455	22,7	24,1

(*) Passeggeri arrivati + partiti

S.E.A./Pianificazione e Controllo

dati preliminari:

Giorno	Numero Movimenti Aeromobili: di Linea Arr.	di Linea Part.	Charter Arr.	Charter Part.	Totale Mov.	Traffico Passeggeri: di Linea Arr.	di Linea Part.	Charter Arr.	Charter Part.	Totale Arr.	Totale Part.	Trans. diretto	Totale Pax	Merce: Kg Arrivo	Kg Partenza	Kg Totale
1 GIO	91	90			181	8597	9110			8597	9110		17707	5754	8403	14157
2 VEN	94	97			191	7783	9348			7783	9348		17131	9816	8480	18296
3 SAB	65	70			135	5100	6723			5100	6723		11823	7632	6370	14002
4 DOM	73	67	1		141	7940	6290			7940	6290		14230	3996	1321	5317
5 LUN	93	93	1		187	8719	8614			8719	8614		17333	8257	4435	12692
6 MAR	93	94			187	8489	8452			8489	8452		16941	6915	8639	15554
7 MER	94	93			187	8895	9258			8895	9258		18153	7855	8924	16779
8 GIO	95	94			189	9138	9437			9138	9437		18575	11161	8408	19569
9 VEN	95	96			191	8686	9915			8686	9915		18601	8623	11186	19809
10 SAB	67	74			141	6685	7915			6685	7915		14600	6940	8681	15621
11 DOM	76	70			146	7493	6492			7493	6492		13985	1673	2588	4261
12 LUN	94	92			186	9443	8523			9443	8523		17966	7069	4160	11229
13 MAR	94	94			188	8275	9314			8275	9314		17589	11017	8824	19841
14 MER	95	95			190	8977	9800			8977	9800		18777	9865	8665	18530
15 GIO	94	96			190	9075	10128			9075	10128		19203	9829	8045	17874
16 VEN	97	99			196	8638	10964			8638	10964		19602	8342	8129	16471
17 SAB	69	73			142	5845	8108			5845	8108		13953	6429	5111	11540
18 DOM	78	73			151	7924	7171			7924	7171		15095	3826	5307	9133
19 LUN	98	96			194	9826	9477			9826	9477		19303	5757	2806	8563
20 MAR	100	99			199	8761	9287			8761	9287		18048	10444	8709	19153
21 MER	99	99			198	9440	9843			9440	9843		19283	10998	8085	19083
22 GIO	98	99			197	9792	10370			9792	10370		20162	11955	6678	18633
23 VEN	100	101			201	8639	10612			8639	10612		19251	9508	6526	16034
24 SAB	73	76		1	150	6252	8477			6252	8477		14729	6367	5492	11859
25 DOM	80	74			154	8539	7528			8539	7528		16067	2641	3320	5961
TOTALI	2205	2204	2	1	4.412	206951	221156			206951	221156		428107	192669	167292	359961
VALORI MEDI GIORNALIERI GIUGNO 2000																
	88	88			176	8278	8846			8278	8846		17124	7707	6692	14398
PROIEZIONE A FINE MESE																
	2646	2645	2	1	5.294	248341	265387			248341	265387		513728	231203	200750	431953
CONSUNTIVO MESE DI GIUGNO 1999																
	3052	3052	43	42	6.189	294222	310180	2382	4615	296604	314795		611399	1025563	956036	1981599
VARIAZIONE % DELLA PROIEZIONE 2000 RISPETTO AL CONSUNTIVO 1999																
	-13,3	-13,3	-94,4	-97,1	-14,5	-15,6	-14,4	-100,0	-100,0	-16,3	-15,7		-16,0	-77,5	-79,0	-78,2

CONFRONTO :	PROIEZIONE: GIUGNO 2000	BUDGET GIUGNO 2000	% proiez. 2000: risp. al piano	CONSUNTIVO GIUGNO 1999	% proiezione 2000: su consuntivo 1999	variazione % 2000/1999: periodo 01/25 GIUGNO
TOTALE MOVIMENTI	5.294	6.042	-12,4	6.189	-14,5	-15,5
TOTALE TONNELLAGGIO	336.689	413.086	-18,5	418.339	-19,5	-20,5
TOTALE PASSEGGERI (*)	513.728	627.679	-18,2	611.399	-16,0	-17,1
TOTALE MERCE	431.953	1.905.000	-77,3	1.981.599	-78,2	-78,6

(*) Passeggeri arrivati + partiti

Annex 6 Rolling Annual Traffic Data for Milan Airport System (to May 2000)

SISTEMA AEROPORTUALE DI MILANO

ANALISI DEI DATI DI TRAFFICO
PER COMPAGNIA AEREA E SCALO DI ORIGINE E DESTINAZIONE

MAY

AL MESE DI MAGGIO 2000

AEROPORTI DI MILANO

PIANIFICAZIONE E CONTROLLO

Indice

Il ruolo svolto dalle principali Compagnie Aeree operanti sul Sistema Aeroportuale di Milano

IL RUOLO SVOLTO DAI VETTORI SUGLI AEROPORTI DI MILANO
Dati Progressivi al mese di MAGGIO 2000

22 Giu 2000

MOVIMENTI AEREI

VETTORE	POS. 2000	SISTEMA 2000	SISTEMA 1999	SISTEMA Var.%	LINATE 2000	LINATE 1999	LINATE Var.%	MALPENSA 2000	MALPENSA 1999	MALPENSA Var.%
AZ ALITALIA	1	64,772	61,284	5.7	12,787	13,024	-1.8	51,985	48,260	7.7
LH LUFTHANSA	2	6,475	5,598	15.7	1,180	1,579	-25.3	5,295	4,019	31.7
PE AIR EUROPE S.P.A.	3	6,049	1,735	248.6	4			6,045	1,735	248.4
AP AIR ONE	4	5,227	4,820	8.4	5,217	4,816	8.3	10	4	150.0
BA BRITISH AIRWAYS	5	3,798	3,398	11.8	1,389	1,576	-11.9	2,409	1,822	32.2
AF AIR FRANCE	6	3,131	3,001	4.3	759	806	-5.8	2,372	2,195	8.1
IG MERIDIANA	7	2,612	2,687	-2.8	744	745	-0.1	1,868	1,942	-3.8
SN SABENA WORLD AIRLINES	8	2,046	1,379	48.4	619	770	-19.6	1,427	609	134.3
GJ EUROFLY	9	1,868	1,371	36.3	2	3	-33.3	1,866	1,368	36.4
IB IBERIA	10	1,812	1,599	13.3	648	778	-16.7	1,164	821	41.8
SR SWISSAIR	11	1,781	1,744	2.1				1,781	1,744	2.1
KL K.L.M.	12	1,502	1,583	-5.1	478	684	-30.1	1,024	899	13.9
SK S.A.S.	13	1,465	1,283	14.2	422	597	-29.3	1,043	686	52.0
EW EUROWINGS	14	1,384	1,378	0.4		2	-100.0	1,384	1,376	0.6
VM REGIONAL FLTS (FRANCIA)	15	1,340	1,354	-1.0		4	-100.0	1,340	1,350	-0.7
OG GO FLY LTD	16	1,084	807	34.3				1,084	807	34.3
VT VOLARE - THIENE - ITALY	17	1,038	471	120.4	1			1,037	471	120.2
NL LAUDA ITALIA	18	963	796	21.0	22	5	340.0	941	791	19.0
LX CROSSAIR	19	780	34	2194.1				780	34	2194.1
OS A.U.A.	20	773	763	1.3	552	761	-27.5	221	2	1095*1
UK UK (BUZZ)	21	765	1,068	-28.4	588	748	-21.4	177	320	-44.7
OA OLYMPIC AIRWAYS	22	710	466	52.4	400	416	-3.8	310	50	520.0
AT ROYAL AIR MAROC	23	528	507	4.1				528	507	4.1
TU TUNISAIR	24	528	497	6.2				528	497	6.2
MA MALEV	25	494	450	9.8				494	450	9.8
BM AIR SICILIA	26	440	12	3566.7	438			2	12	-83.3
TP T.A.P. LINEE AEREE PORTOGHES	27	438	300	46.0		300	-100.0	438		
UX AIR EUROPA PALMA DE MALLORCA	28	425	46	823.9				425	46	823.9
JL J.A.L. JAPAN AIR LINES	29	390	350	11.4				390	350	11.4
BP BLUE PANORAMA AIRLINES	30	385	176	118.8		4	-100.0	385	172	123.8
RG VARIG S.A.	31	380	540	-29.6				380	540	-29.6
ZS AZZURRA - BERGAMO	32	359	149	140.9		18	-100.0	359	131	174.0
YF EPA-EXPRESS AIRWAYS	33	330	4	8150.0				330	4	8150.0
AY FINNAIR	34	328	360	-8.9		360	-100.0	328		
SU AEROFLOT	35	318	310	2.6				318	310	2.6
AA AMERICAN AIRLINES	36	304	294	3.4				304	294	3.4
TK TURKISH AIRLINES	37	304	304					304	304	
TW T.W.A.	38	304	302	0.7				304	302	0.7
BU BRAATHENS SAFE	39	302	304	-0.7				302	304	-0.7
CO CONTINENTAL AIR LINES	40	302	300	0.7				302	300	0.7
..X DIVERSI	41	6,409	6,186	3.6	609	771	-21.0	5,800	5,415	7.1
	TOT.	124,643	110,010	13.3	26,859	28,767	-6.6	97,784	81,243	20.4

IL RUOLO SVOLTO DAI VETTORI SUGLI AEROPORTI DI MILANO

Dati Progressivi al mese di MAGGIO 2000

PASSEGGERI (A+P)

	VETTORE	POS. 2000	SISTEMA 2000	SISTEMA 1999	SISTEMA Var.%	LINATE 2000	LINATE 1999	LINATE Var.%	MALPENSA 2000	MALPENSA 1999	MALPENSA Var.%
AZ	ALITALIA	1	5,548,999	4,919,002	12.8	1,315,580	1,268,080	3.7	4,233,419	3,650,922	16.0
PE	AIR EUROPE S.P.A.	2	507,608	231,496	119.3	225			507,383	231,496	119.2
AP	AIR ONE	3	420,553	372,426	12.9	420,048	372,166	12.9	505	260	94.2
LH	LUFTHANSA	4	354,898	312,627	13.5	137,621	174,343	-21.1	217,277	138,284	57.1
BA	BRITISH AIRWAYS	5	296,960	291,456	1.9	146,786	176,671	-16.9	150,174	114,785	30.8
GJ	EUROFLY	6	267,940	151,139	77.3		120	-100.0	267,940	151,019	77.4
AF	AIR FRANCE	7	254,593	245,674	3.6	83,412	102,375	-18.5	171,181	143,299	19.5
IG	MERIDIANA	8	223,281	231,904	-3.7	66,122	76,578	-13.7	157,159	155,326	1.2
IB	IBERIA	9	197,758	188,476	4.9	85,111	112,576	-24.4	112,647	75,900	48.4
NL	LAUDA ITALIA	10	170,873	130,059	31.4		38	-100.0	170,873	130,021	31.4
KL	K.L.M.	11	125,818	128,210	-1.9	37,919	60,684	-37.5	87,899	67,526	30.2
SN	SABENA WORLD AIRLINES	12	108,735	93,343	16.5	40,597	60,921	-33.4	68,138	32,422	110.2
SR	SWISSAIR	13	106,003	97,902	8.3				106,003	97,902	8.3
SK	S.A.S.	14	105,691	86,407	22.3	31,850	45,733	-30.4	73,841	40,674	81.5
OG	GO FLY LTD	15	98,925	53,107	86.3				98,925	53,107	86.3
VT	VOLARE - THIENE - ITALY	16	94,109	52,944	77.8				94,109	52,944	77.8
CO	CONTINENTAL AIR LINES	17	62,494	58,183	7.4				62,494	58,183	7.4
AT	ROYAL AIR MAROC	18	57,863	48,250	19.9				57,863	48,250	19.9
TU	TUNISAIR	19	54,341	48,607	11.8				54,341	48,607	11.8
UA	UNITED AIRL (60666 ORD USA)	20	52,198	48,641	7.3				52,198	48,641	7.3
OS	A.U.A.	21	49,158	49,663	-1.0	35,353	49,595	-28.7	13,805	68	2020*1
AA	AMERICAN AIRLINES	22	48,896	46,156	5.9				48,896	46,156	5.9
UK	UK (BUZZ)	23	48,066	62,248	-22.8	41,908	49,958	-16.1	6,158	12,290	-49.9
OA	OLYMPIC AIRWAYS	24	46,054	38,797	18.7	29,733	36,317	-18.1	16,321	2,480	558.1
JL	J.A.L. JAPAN AIR LINES	25	43,101	29,855	44.4				43,101	29,855	44.4
DL	DELTA AIRLINES INC. USA	26	40,145	38,270	4.9				40,145	38,270	4.9
EW	EUROWINGS	27	38,452	28,908	33.0		30	-100.0	38,452	28,878	33.2
TP	T.A.P. LINEE AEREE PORTOGHES	28	37,132	27,453	35.3		27,453	-100.0	37,132		
RG	VARIG S.A.	29	36,922	39,179	-5.8				36,922	39,179	-5.8
TW	T.W.A.	30	35,392	40,904	-13.5				35,392	40,904	-13.5
SU	AEROFLOT	31	34,227	25,710	33.1				34,227	25,710	33.1
LY	EL AL ISRAEL AIRLINES	32	32,340	21,371	51.3				32,340	21,371	51.3
BP	BLUE PANORAMA AIRLINES	33	31,782	12,723	149.8		230	-100.0	31,782	12,493	154.4
TK	TURKISH AIRLINES	34	30,328	23,932	26.7				30,328	23,932	26.7
VM	REGIONAL FLTS (FRANCIA)	35	29,463	24,911	18.3		28	-100.0	29,463	24,883	18.4
MA	MALEV	36	29,462	23,092	27.6				29,462	23,092	27.6
MS	EGYPT AIR	37	28,696	36,174	-20.7				28,696	36,174	-20.7
UX	AIR EUROPA PALMA DE MALLORCA	38	28,193	4,937	471.1				28,193	4,937	471.1
TV	VIRGIN EXPRESS	39	27,698	31,513	-12.1	27,698	30,560	-9.4		953	-100.0
AY	FINNAIR	40	26,724	29,112	-8.2		29,112	-100.0	26,724		
..X	DIVERSI	41	424,280	306,336	38.5	26,170	27,227	-3.9	398,110	279,109	42.6
		TOT.	10,256,151	8,731,097	17.5	2,526,133	2,700,795	-6.5	7,730,018	6,030,302	28.2

Dati Progressivi al mese di MAGGIO 2000

MERCE (Kg)

Cod.	VETTORE	POS. 2000	SISTEMA 2000	SISTEMA 1999	SISTEMA Var.%	LINATE 2000	LINATE 1999	LINATE Var.%	MALPENSA 2000	MALPENSA 1999	MALPENSA Var.%
AZ	ALITALIA	1	76,864,048	64,395,549	19.4	1,146,837	1,469,574	-22.0	75,717,211	62,925,975	20.3
KZ	NIPPON CARGO AIRLINES	2	7,000,060	5,560,530	25.9				7,000,060	5,560,530	25.9
KE	KOREAN AIR LINES	3	4,215,329	3,521,604	19.7				4,215,329	3,521,604	19.7
BA	BRITISH AIRWAYS	4	4,096,391	3,145,468	30.2	2,659,875	2,757,741	-3.5	1,436,516	387,727	270.5
KL	K.L.M.	5	2,956,773	5,058,207	-41.5	6,503	576,281	-98.9	2,950,270	4,481,926	-34.2
CO	CONTINENTAL AIR LINES	6	2,548,690	2,275,183	12.0				2,548,690	2,275,183	12.0
UA	UNITED AIRL (60666 ORD USA)	7	2,330,425	1,793,659	29.9				2,330,425	1,793,659	29.9
AA	AMERICAN AIRLINES	8	2,304,417	1,765,853	30.5				2,304,417	1,765,853	30.5
FX	FEDERAL EXPRESS	9	2,203,986	2,124,994	3.7				2,203,986	2,124,994	3.7
DL	DELTA AIRLINES INC. USA	10	1,895,921	1,411,820	34.3				1,895,921	1,411,820	34.3
CA	AIR CHINA	11	1,400,744	619,883	126.0				1,400,744	619,883	126.0
TW	T.W.A.	12	1,354,875	1,288,714	5.1				1,354,875	1,288,714	5.1
LH	LUFTHANSA	13	1,327,854	2,093,798	-36.6	1,203,633	1,985,381	-39.4	124,221	108,417	14.6
PE	AIR EUROPE S.P.A.	14	1,207,388	610,505	97.8	514			1,206,874	610,505	97.7
JL	J.A.L. JAPAN AIR LINES	15	985,265	743,331	32.5				985,265	743,331	32.5
CP	CANADIAN AIRLINES INTL.	16	812,840						812,840		
SU	AEROFLOT	17	778,267	419,456	85.5				778,267	419,456	85.5
IB	IBERIA	18	740,110	555,321	33.3	252,824	548,889	-53.9	487,286	6,432	7476.0
RG	VARIG S.A.	19	691,707	1,020,408	-32.2				691,707	1,020,408	-32.2
MS	EGYPT AIR	20	686,098	652,389	5.2				686,098	652,389	5.2
NW	NORTHWEST AIRLINES	21	589,353						589,353		
TK	TURKISH AIRLINES	22	560,875	316,991	76.9				560,875	316,991	76.9
SR	SWISSAIR	23	533,224	97,820	445.1				533,224	97,820	445.1
LY	EL AL ISRAEL AIRLINES	24	438,678	294,993	48.7				438,678	294,993	48.7
SK	S.A.S.	25	350,996	320,872	9.4	167,971	283,400	-40.7	183,025	37,472	388.4
OA	OLYMPIC AIRWAYS	26	346,233	425,605	-18.6	330,184	424,222	-22.2	16,049	1,383	1060.4
NL	LAUDA ITALIA	27	342,817	358,549	-4.4				342,817	358,549	-4.4
IG	MERIDIANA	28	312,661	346,441	-9.8	174,648	259,847	-32.8	138,013	86,594	59.4
OS	A.U.A.	29	269,289	338,873	-20.5	267,595	338,713	-21.0	1,694	160	958.7
EK	EMIRATES	30	242,876						242,876		
TP	T.A.P. LINEE AEREE PORTOGHES	31	234,037	219,067	6.8		219,067	-100.0	234,037		
AY	FINNAIR	32	224,781	208,828	7.6		208,828	-100.0	224,781		
AT	ROYAL AIR MAROC	33	213,125	180,502	18.1				213,125	180,502	18.1
AF	AIR FRANCE	34	189,857	430,254	-55.9	189,799	429,201	-55.8	58	1,053	-94.5
AP	AIR ONE	35	185,969	164,421	13.1	185,969	164,421	13.1			
YF	EPA-EXPRESS AIRWAYS	36	172,774						172,774		
SN	SABENA WORLD AIRLINES	37	143,734	473,729	-69.7	4,656	472,371	-99.0	139,078	1,358	1014*1
EI	AER LINGUS	38	122,907	70,214	75.0		70,214	-100.0	122,907		
KM	AIR MALTA	39	114,858	147,736	-22.3		1,776	-100.0	114,858	145,960	-21.3
CY	CYPRUS AIRWAYS	40	113,256	45,501	148.9				113,256	45,501	148.9
..X	DIVERSI	41	949,360	901,147	5.4	75,389	68,040	10.8	873,971	833,107	4.9
		TOT.	123,052,848	104,398,215	17.9	6,666,397	10,277,966	-35.1	116,386,451	94,120,249	23.7

Dati Mensili del mese di MAGGIO 2000

			MOVIMENTI AEREI								
			SISTEMA			LINATE			MALPENSA		
VETTORE		POS. 2000	2000	1999	Var.%	2000	1999	Var.%	2000	1999	Var.%
AZ	ALITALIA	1	13,844	12,983	6.6	2,469	2,792	-11.6	11,375	10,191	11.6
LH	LUFTHANSA	2	1,417	1,242	14.1		332	-100.0	1,417	910	55.7
PE	AIR EUROPE S.P.A.	3	1,199	584	105.3	4			1,195	584	104.6
AP	AIR ONE	4	1,062	1,065	-0.3	1,062	1,065	-0.3			
BA	BRITISH AIRWAYS	5	841	699	20.3	188	314	-40.1	653	385	69.6
IG	MERIDIANA	6	641	583	9.9	62	202	-69.3	579	381	52.0
AF	AIR FRANCE	7	630	600	5.0	122	160	-23.7	508	440	15.5
GJ	EUROFLY	8	381	299	27.4				381	299	27.4
IB	IBERIA	9	372	357	4.2	62	155	-60.0	310	202	53.5
SR	SWISSAIR	10	362	368	-1.6				362	368	-1.6
VT	VOLARE - THIENE - ITALY	11	359	105	241.9	1			358	105	241.0
SN	SABENA WORLD AIRLINES	12	353	288	22.6	54	156	-65.4	299	132	126.5
KL	K.L.M.	13	310	324	-4.3	62	124	-50.0	248	200	24.0
SK	S.A.S.	14	310	298	4.0		124	-100.0	310	174	78.2
EW	EUROWINGS	15	294	284	3.5				294	284	3.5
VM	REGIONAL FLTS (FRANCIA)	16	286	282	1.4				286	282	1.4
BD	BRITISH MIDLAND	17	237						237		
OG	GO FLY LTD	18	211	160	31.9				211	160	31.9
OA	OLYMPIC AIRWAYS	19	176	96	83.3	62	88	-29.5	114	8	1325.0
LX	CROSSAIR	20	168	6	2700.0				168	6	2700.0
OS	A.U.A.	21	166	156	6.4		156	-100.0	166		
UK	UK (BUZZ)	22	162	176	-8.0	162	156	3.8		20	-100.0
BP	BLUE PANORAMA AIRLINES	23	159	65	144.6				159	65	144.6
NL	LAUDA ITALIA	24	140	118	18.6		5	-100.0	140	113	23.9
TU	TUNISAIR	25	132	129	2.3				132	129	2.3
AT	ROYAL AIR MAROC	26	116	113	2.7				116	113	2.7
MA	MALEV	27	116	108	7.4				116	108	7.4
UX	AIR EUROPA PALMA DE MALLORCA	28	104	38	173.7				104	38	173.7
RG	VARIG S.A.	29	98	60	63.3				98	60	63.3
TP	T.A.P. LINEE AEREE PORTOGHES	30	98	62	58.1		62	-100.0	98		
ZS	AZZURRA - BERGAMO	31	92	98	-6.1		8	-100.0	92	90	2.2
2D	FEDERICO SECONDO	32	88	86	2.3				88	86	2.3
JL	J.A.L. JAPAN AIR LINES	33	78	76	2.6				78	76	2.6
BM	AIR SICILIA	34	72	6	1100.0	72				6	-100.0
SU	AEROFLOT	35	70	66	6.1				70	66	6.1
YF	EPA-EXPRESS AIRWAYS	36	70	4	1650.0				70	4	1650.0
EI	AER LINGUS	37	68	62	9.7		62	-100.0	68		
BU	BRAATHENS SAFE	38	66	62	6.5				66	62	6.5
G7	GANDALF	39	66			66					
AA	AMERICAN AIRLINES	40	62	62					62	62	
..X	DIVERSI	41	1,506	1,597	-5.7	115	192	-40.1	1,391	1,405	-1.0
		TOT.	26,982	23,767	13.5	4,563	6,153	-25.8	22,419	17,614	27.3

IL RUOLO SVOLTO DAI VETTORI SUGLI AEROPORTI DI MILANO
Dati Mensili del mese di MAGGIO 2000

	VETTORE	POS. 2000	SISTEMA 2000	SISTEMA 1999	SISTEMA Var.%	LINATE 2000	LINATE 1999	LINATE Var.%	MALPENSA 2000	MALPENSA 1999	MALPENSA Var.%
AZ	ALITALIA	1	1,306,332	1,107,870	17.9	281,228	290,265	-3.1	1,025,104	817,605	25.4
PE	AIR EUROPE S.P.A.	2	108,914	36,159	201.2	225			108,689	36,159	200.6
AP	AIR ONE	3	87,287	89,879	-2.9	87,287	89,879	-2.9			
LH	LUFTHANSA	4	83,169	72,558	14.6		36,717	-100.0	83,169	35,841	132.0
BA	BRITISH AIRWAYS	5	67,461	68,148	-1.0	24,337	38,683	-37.1	43,124	29,465	46.4
IG	MERIDIANA	6	61,101	54,773	11.6	6,249	21,165	-70.5	54,852	33,608	63.2
AF	AIR FRANCE	7	54,761	51,348	6.6	13,106	20,884	-37.2	41,655	30,464	36.7
GJ	EUROFLY	8	46,947	28,542	64.5				46,947	28,542	64.5
IB	IBERIA	9	43,123	39,022	10.5	8,969	21,287	-57.9	34,154	17,735	92.6
VT	VOLARE - THIENE - ITALY	10	30,677	11,521	166.3				30,677	11,521	166.3
KL	K.L.M.	11	29,215	31,005	-5.8	5,256	13,608	-61.4	23,959	17,397	37.7
SK	S.A.S.	12	26,210	21,107	24.2		10,069	-100.0	26,210	11,038	137.5
NL	LAUDA ITALIA	13	25,996	18,251	42.4		38	-100.0	25,996	18,213	42.7
SN	SABENA WORLD AIRLINES	14	23,876	21,677	10.1	3,503	13,427	-73.9	20,373	8,250	146.9
SR	SWISSAIR	15	23,538	21,166	11.2				23,538	21,166	11.2
OG	GO FLY LTD	16	15,724	10,491	49.9				15,724	10,491	49.9
UA	UNITED AIRL (60666 ORD USA)	17	14,994	11,667	28.5				14,994	11,667	28.5
TU	TUNISAIR	18	14,051	12,845	9.4				14,051	12,845	9.4
NW	NORTHWEST AIRLINES	19	13,783						13,783		
CO	CONTINENTAL AIR LINES	20	13,332	12,594	5.9				13,332	12,594	5.9
BP	BLUE PANORAMA AIRLINES	21	13,221	5,173	155.6				13,221	5,173	155.6
UK	UK (BUZZ)	22	12,201	12,256	-0.4	12,201	11,714	4.2		542	-100.0
OA	OLYMPIC AIRWAYS	23	11,877	9,344	27.1	4,857	8,996	-46.0	7,020	348	1917.2
BD	BRITISH MIDLAND	24	11,783						11,783		
AA	AMERICAN AIRLINES	25	11,718	11,183	4.8				11,718	11,183	4.8
AT	ROYAL AIR MAROC	26	11,539	10,678	8.1				11,539	10,678	8.1
OS	A.U.A.	27	10,541	10,129	4.1		10,129	-100.0	10,541		
TP	T.A.P. LINEE AEREE PORTOGHES	28	10,011	6,096	64.2		6,096	-100.0	10,011		
DL	DELTA AIRLINES INC. USA	29	9,770	8,804	11.0				9,770	8,804	11.0
JL	J.A.L. JAPAN AIR LINES	30	8,793	6,262	40.4				8,793	6,262	40.4
LY	EL AL ISRAEL AIRLINES	31	8,451	5,675	48.9				8,451	5,675	48.9
EW	EUROWINGS	32	8,450	5,840	44.7				8,450	5,840	44.7
TW	T.W.A.	33	8,378	10,416	-19.6				8,378	10,416	-19.6
RG	VARIG S.A.	34	8,139	7,476	8.9				8,139	7,476	8.9
UX	AIR EUROPA PALMA DE MALLORCA	35	7,950	4,212	88.7				7,950	4,212	88.7
TK	TURKISH AIRLINES	36	7,475	5,420	37.9				7,475	5,420	37.9
SU	AEROFLOT	37	7,431	5,657	31.4				7,431	5,657	31.4
VM	REGIONAL FLTS (FRANCIA)	38	7,311	6,725	8.7				7,311	6,725	8.7
MA	MALEV	39	6,716	5,325	26.1				6,716	5,325	26.1
TY	IBERWORLD	40	6,696	1,971	239.7				6,696	1,971	239.7
..X	DIVERSI	41	92,937	103,408	-10.1	10,019	20,148	-50.3	82,918	83,260	-0.4
		TOT.	2,371,879	1,962,673	20.8	457,237	613,105	-25.4	1,914,642	1,349,568	41.9

IL RUOLO SVOLTO DAI VETTORI SUGLI AEROPORTI DI MILANO
Dati Mensili del mese di MAGGIO 2000

MERCE (Kg)

		POS.	SISTEMA			LINATE			MALPENSA		
	VETTORE	2000	2000	1999	Var.%	2000	1999	Var.%	2000	1999	Var.%
AZ	ALITALIA	1	16,260,734	14,595,743	11.4	226,183	283,634	-20.3	16,034,551	14,312,109	12.0
KZ	NIPPON CARGO AIRLINES	2	1,415,348	1,200,183	17.9				1,415,348	1,200,183	17.9
KE	KOREAN AIR LINES	3	939,653	886,532	6.0				939,653	886,532	6.0
BA	BRITISH AIRWAYS	4	723,809	751,965	-3.7	54,499	606,953	-91.0	669,310	145,012	361.6
KL	K.L.M.	5	544,412	706,291	-22.9		92,809	-100.0	544,412	613,482	-11.3
UA	UNITED AIRL (60666 ORD USA)	6	476,708	313,727	51.9				476,708	313,727	51.9
FX	FEDERAL EXPRESS	7	467,237	551,647	-15.3				467,237	551,647	-15.3
AA	AMERICAN AIRLINES	8	438,448	413,842	5.9				438,448	413,842	5.9
CO	CONTINENTAL AIR LINES	9	431,422	530,339	-18.7				431,422	530,339	-18.7
DL	DELTA AIRLINES INC. USA	10	376,461	298,737	26.0				376,461	298,737	26.0
NW	NORTHWEST AIRLINES	11	280,981						280,981		
TW	T.W.A.	12	277,187	247,248	12.1				277,187	247,248	12.1
CA	AIR CHINA	13	272,801	151,745	79.8				272,801	151,745	79.8
PE	AIR EUROPE S.P.A.	14	195,730	80,113	144.3	514			195,216	80,113	143.7
JL	J.A.L. JAPAN AIR LINES	15	191,552	141,198	35.7				191,552	141,198	35.7
EK	EMIRATES	16	150,131						150,131		
SU	AEROFLOT	17	148,154	88,665	67.1				148,154	88,665	67.1
RG	VARIG S.A.	18	144,938	211,425	-31.4				144,938	211,425	-31.4
TK	TURKISH AIRLINES	19	141,015	70,206	100.9				141,015	70,206	100.9
SR	SWISSAIR	20	136,175	45,593	198.7				136,175	45,593	198.7
IB	IBERIA	21	122,989	135,129	-9.0	22,959	133,387	-82.8	100,030	1,742	5642.3
MS	EGYPT AIR	22	95,321	128,503	-25.8				95,321	128,503	-25.8
IG	MERIDIANA	23	79,302	94,008	-15.6	31,514	54,390	-42.1	47,788	39,618	20.6
LY	EL AL ISRAEL AIRLINES	24	77,576	85,223	-9.0				77,576	85,223	-9.0
OA	OLYMPIC AIRWAYS	25	76,524	90,384	-15.3	61,649	90,384	-31.8	14,875		
GF	GULF AIR COMPANY	26	63,794						63,794		
SK	S.A.S.	27	60,902	69,601	-12.5		54,348	-100.0	60,902	15,253	299.3
AT	ROYAL AIR MAROC	28	56,652	38,097	48.7				56,652	38,097	48.7
NL	LAUDA ITALIA	29	53,187	58,472	-9.0				53,187	58,472	-9.0
CY	CYPRUS AIRWAYS	30	44,213	11,036	300.6				44,213	11,036	300.6
TP	T.A.P. LINEE AEREE PORTOGHES	31	44,113	44,052	0.1		44,052	-100.0	44,113		
AY	FINNAIR	32	43,140	44,147	-2.3		44,147	-100.0	43,140		
YF	EPA-EXPRESS AIRWAYS	33	38,572						38,572		
AF	AIR FRANCE	34	32,108	104,795	-69.4	32,108	104,795	-69.4			
SN	SABENA WORLD AIRLINES	35	27,963	100,296	-72.1		100,296	-100.0	27,963		
GJ	EUROFLY	36	24,636	3,971	520.4				24,636	3,971	520.4
BD	BRITISH MIDLAND	37	22,756						22,756		
AP	AIR ONE	38	21,420	31,868	-32.8	21,420	31,868	-32.8			
EI	AER LINGUS	39	19,844	18,664	6.3		18,664	-100.0	19,844		
QY	EUROPEAN AIR TRANSPORT	40	19,600						19,600		
..X	DIVERSI	41	139,668	825,373	-83.1	22,702	488,930	-95.4	116,966	336,443	-65.2
		TOT.	25,177,176	23,168,818	8.7	473,548	2,148,657	-78.0	24,703,628	21,020,161	17.5

Le principali relazioni del Sistema Aeroportuale di Milano

 LE PRINCIPALI RELAZIONI DI MILANO

Dati Progressivi al mese di MAGGIO 2000

MOVIMENTI AEREI

SCALO DI	POS. 2000	SISTEMA 2000	SISTEMA 1999	SISTEMA Var.%	LINATE 2000	LINATE 1999	LINATE Var.%	MALPENSA 2000	MALPENSA 1999	MALPENSA Var.%
ROM ROMA	1	15,597	14,826	5.2	10,949	10,452	4.8	4,648	4,374	6.3
LON LONDRA	2	7,038	6,641	6.0	2,621	3,294	-20.4	4,417	3,347	32.0
PAR PARIGI	3	5,163	4,991	3.4	1,513	1,924	-21.4	3,650	3,067	19.0
NAP NAPOLI	4	4,852	2,895	67.6	855	610	40.2	3,997	2,285	74.9
CTA CATANIA	5	4,719	2,675	76.4	596	406	46.8	4,123	2,269	81.7
BRU BRUSSELS	6	3,813	3,082	23.7	1,530	1,708	-10.4	2,283	1,374	66.2
PMO PALERMO	7	3,374	2,033	66.0	494	386	28.0	2,880	1,647	74.9
FRA FRANCOFORTE	8	3,215	3,152	2.0	1,831	2,249	-18.6	1,384	903	53.3
MAD MADRID	9	2,881	2,246	28.3	648	775	-16.4	2,233	1,471	51.8
AMS AMSTERDAM	10	2,859	2,891	-1.1	819	1,106	-25.9	2,040	1,785	14.3
ZRH ZURIGO	11	2,678	2,396	11.8	2			2,676	2,396	11.7
BRI BARI	12	2,497	965	158.8	1,226	284	331.7	1,271	681	86.6
MUC MONACO	13	2,032	1,945	4.5	2			2,030	1,945	4.4
DUS DUSSELDORF	14	1,924	1,881	2.3	1	1		1,923	1,880	2.3
ATH ATENE	15	1,909	1,265	50.9	332	306	8.5	1,577	959	64.4
BCN BARCELLONA	16	1,841	1,771	4.0	3	7	-57.1	1,838	1,764	4.2
CPH COPENHAGEN	17	1,796	1,548	16.0	319	450	-29.1	1,477	1,098	34.5
LYS LIONE	18	1,670	1,583	5.5		7	-100.0	1,670	1,576	6.0
STR STOCCARDA	19	1,608	1,597	0.7	2			1,606	1,597	0.6
HAM AMBURGO	20	1,499	1,190	26.0				1,499	1,190	26.0
VIE VIENNA	21	1,471	1,451	1.4	560	763	-26.6	911	688	32.4
NEW NEW YORK	22	1,427	1,294	10.3				1,427	1,294	10.3
PSA PISA	23	1,282	1,012	26.7	1	13	-92.3	1,281	999	28.2
BLQ BOLOGNA	24	1,236	1,339	-7.7	3	4	-25.0	1,233	1,335	-7.6
TRS TRIESTE	25	1,220	1,277	-4.5	2	13	-84.6	1,218	1,264	-3.6
VCE VENEZIA	26	1,203	1,182	1.8	1	3	-66.7	1,202	1,179	2.0
FLR FIRENZE	27	1,192	1,294	-7.9				1,192	1,294	-7.9
CAG CAGLIARI	28	1,186	1,189	-0.3	726	696	4.3	460	493	-6.7
BER BERLINO	29	1,173	902	30.0				1,173	902	30.0
STO STOCCOLMA	30	1,165	1,093	6.6	103	447	-77.0	1,062	646	64.4
GOA GENOVA	31	1,113	1,090	2.1	3	1	200.0	1,110	1,089	1.9
HAJ HANOVER	32	1,004	874	14.9	1	28	-96.4	1,003	846	18.6
CGN COLONIA	33	992	979	1.3	2	1	100.0	990	978	1.2
NCE NIZZA	34	912	1,035	-11.9	2	5	-60.0	910	1,030	-11.7
MRS MARSIGLIA	35	908	896	1.3		3	-100.0	908	893	1.7
SSH SHARM EL SHEIKH	36	902	762	18.4		68	-100.0	902	694	30.0
REG REGGIO C.	37	894	863	3.6	296	269	10.0	598	594	0.7
GVA GINEVRA	38	891	1,007	-11.5		1	-100.0	891	1,006	-11.4
AOI ANCONA	39	882	982	-10.2	10	106	-90.6	872	876	-0.5
VRN VERONA	40	873	493	77.1		2	-100.0	873	491	77.8
..X DIVERSI	41	29,752	27,423	8.5	1,406	2,379	-40.9	28,346	25,044	13.2
	TOT.	124,643	110,010	13.3	26,859	28,767	-6.6	97,784	81,243	20.4

LE PRINCIPALI RELAZIONI DI MILANO
Dati Progressivi al mese di MAGGIO 2000

SCALO DI	POS. 2000	SISTEMA 2000	SISTEMA 1999	SISTEMA Var.%	LINATE 2000	LINATE 1999	LINATE Var.%	MALPENSA 2000	MALPENSA 1999	MALPENSA Var.%
ROM ROMA	1	1,470,434	1,368,242	7.5	1,119,840	1,055,907	6.1	350,594	312,335	12.2
LON LONDRA	2	624,457	594,567	5.0	258,389	325,077	-20.5	366,068	269,490	35.8
PAR PARIGI	3	465,009	447,561	3.9	158,011	202,723	-22.1	306,998	244,838	25.4
NAP NAPOLI	4	464,908	313,373	48.4	94,336	70,472	33.9	370,572	242,901	52.6
CTA CATANIA	5	421,071	267,959	57.1	72,249	41,603	73.7	348,822	226,356	54.1
PMO PALERMO	6	293,131	196,912	48.9	53,858	42,918	25.5	239,273	153,994	55.4
MAD MADRID	7	284,781	246,673	15.4	85,111	112,556	-24.4	199,670	134,117	48.9
FRA FRANCOFORTE	8	272,544	252,110	8.1	171,793	207,293	-17.1	100,751	44,817	124.8
BRI BARI	9	233,738	99,851	134.1	110,139	26,113	321.8	123,599	73,738	67.6
NEW NEW YORK	10	232,441	207,291	12.1				232,441	207,291	12.1
AMS AMSTERDAM	11	229,611	221,904	3.5	64,468	94,816	-32.0	165,143	127,088	29.9
BRU BRUSSELS	12	209,080	199,265	4.9	95,911	123,158	-22.1	113,169	76,107	48.7
BCN BARCELLONA	13	168,292	156,361	7.6	79	336	-76.5	168,213	156,025	7.8
ATH ATENE	14	147,891	132,391	11.7	27,636	33,391	-17.2	120,255	99,000	21.5
SSH SHARM EL SHEIKH	15	142,138	118,967	19.5		9,497	-100.0	142,138	109,470	29.8
ZRH ZURIGO	16	130,799	118,392	10.5	10			130,789	118,392	10.5
TLV TEL AVIV	17	120,256	88,776	35.5				120,256	88,776	35.5
CPH COPENHAGEN	18	112,777	93,220	21.0	25,648	38,160	-32.8	87,129	55,060	58.2
DUS DUSSELDORF	19	110,317	104,818	5.2	40			110,277	104,818	5.2
CAG CAGLIARI	20	100,870	105,121	-4.0	65,274	72,101	-9.5	35,596	33,020	7.8
NRT NARITA TOKYO	21	97,432	84,426	15.4				97,432	84,426	15.4
ORD CHICAGO	22	96,779	89,607	8.0				96,779	89,607	8.0
MUC MONACO	23	94,640	97,210	-2.6	5			94,635	97,210	-2.6
VCE VENEZIA	24	94,245	77,159	22.1				94,245	77,159	22.1
VIE VIENNA	25	91,414	84,793	7.8	35,353	49,861	-29.1	56,061	34,932	60.5
CUN CANCUN	26	85,730	72,072	19.0				85,730	72,072	19.0
REG REGGIO C.	27	83,705	60,307	38.8	25,686	19,043	34.9	58,019	41,264	40.6
STO STOCCOLMA	28	74,523	61,468	21.2	6,202	23,083	-73.1	68,321	38,385	78.0
CAI CAIRO	29	72,728	57,691	26.1		176	-100.0	72,728	57,515	26.5
MLE MALE-MALDIVE	30	71,636	62,269	15.0				71,636	62,269	15.0
FLR FIRENZE	31	69,724	58,319	19.6				69,724	58,319	19.6
OLB OLBIA	32	68,135	60,883	11.9	317	4,452	-92.9	67,818	56,431	20.2
LIS LISBONA	33	66,471	69,897	-4.9		28,004	-100.0	66,471	41,893	58.7
PUJ PUNTACANA -DOM.REP.	34	62,188	44,104	41.0				62,188	44,104	41.0
PSA PISA	35	62,102	44,814	38.6		97	-100.0	62,102	44,717	38.9
BER BERLINO	36	59,422	50,568	17.5				59,422	50,568	17.5
CMN CASABLANCA	37	58,467	47,301	23.6				58,467	47,301	23.6
SUF LAMEZIA S.EUFEMIA	38	58,242	61,758	-5.7	719	8,115	-91.1	57,523	53,643	7.2
IST ISTANBUL	39	56,869	42,092	35.1				56,869	42,092	35.1
SVO MOSCA/SHEREMETYEVO	40	56,358	39,822	41.5		265	-100.0	56,358	39,557	42.5
..X DIVERSI	41	2,540,796	2,130,783	19.2	55,059	111,578	-50.7	2,485,737	2,019,205	23.1
	TOT.	10,256,151	8,731,097	17.5	2,526,133	2,700,795	-6.5	7,730,018	6,030,302	28.2

PASSEGGERI (A+P)

Dati Progressivi al mese di MAGGIO 2000

MERCE (Kg)

SCALO DI	POS. 2000	SISTEMA 2000	SISTEMA 1999	SISTEMA Var.%	LINATE 2000	LINATE 1999	LINATE Var.%	MALPENSA 2000	MALPENSA 1999	MALPENSA Var.%
NEW NEW YORK	1	17,807,442	15,257,384	16.7				17,807,442	15,257,384	16.7
ORD CHICAGO	2	12,322,685	10,002,009	23.2				12,322,685	10,002,009	23.2
AMS AMSTERDAM	3	6,129,016	4,403,004	39.2	55,901	625,677	-91.1	6,073,115	3,777,327	60.8
NRT NARITA TOKYO	4	5,970,110	5,712,803	4.5				5,970,110	5,712,803	4.5
LON LONDRA	5	5,262,477	4,309,150	22.1	2,985,668	3,097,768	-3.6	2,276,809	1,211,382	88.0
LAX LOS ANGELES	6	5,000,529	4,247,799	17.7				5,000,529	4,247,799	17.7
KIX OSAKA KANSAI INTL	7	4,330,980	4,069,140	6.4				4,330,980	4,069,140	6.4
MAA MADRAS	8	3,645,368	2,879,488	26.6				3,645,368	2,879,488	26.6
SEL SEOUL	9	3,211,273	3,279,955	-2.1				3,211,273	3,279,955	-2.1
DEL DELHI	10	3,200,438	1,792,385	78.6				3,200,438	1,792,385	78.6
BOM MUMBAI	11	3,097,025	3,070,061	0.9				3,097,025	3,070,061	0.9
ROM ROMA	12	3,066,947	2,937,169	4.4	581,645	665,624	-12.6	2,485,302	2,271,545	9.4
JNB JOHANNESBURG	13	2,928,875	3,025,614	-3.2				2,928,875	3,025,614	-3.2
PEK PEKING	14	2,922,096	1,567,894	86.4				2,922,096	1,567,894	86.4
HKG HONGKONG	15	2,489,673	3,090,590	-19.4				2,489,673	3,090,590	-19.4
IAD WASHINGTON	16	2,330,425	1,793,659	29.9				2,330,425	1,793,659	29.9
PAR PARIGI	17	2,140,684	1,762,327	21.5	277,852	606,469	-54.2	1,862,832	1,155,858	61.2
DXB DUBAI	18	2,001,382	2,732,203	-26.7				2,001,382	2,732,203	-26.7
FRA FRANCOFORTE	19	1,714,440	2,378,506	-27.9	1,253,012	2,070,239	-39.5	461,428	308,267	49.7
BOS BOSTON	20	1,686,651	1,424,251	18.4				1,686,651	1,424,251	18.4
ATL ATLANTA	21	1,582,489	1,918,506	-17.5				1,582,489	1,918,506	-17.5
SFO SAN FRANCISCO	22	1,404,563	50,333	2690.5				1,404,563	50,333	2690.5
YYZ TORONTO	23	1,366,581						1,366,581		
GRU SAN PAOLO	24	1,191,921	1,102,559	8.1				1,191,921	1,102,559	8.1
DKR DAKAR	25	1,179,986	985,420	19.7				1,179,986	985,420	19.7
MAD MADRID	26	917,352	737,415	24.4	252,824	548,889	-53.9	664,528	188,526	252.5
TAS TASHKENT	27	879,892	241,649	264.1				879,892	241,649	264.1
SHA SHANGHAI	28	878,840	1,204,631	-27.0				878,840	1,204,631	-27.0
CAI CAIRO	29	868,261	865,845	0.3				868,261	865,845	0.3
PVG SHANGHAI	30	861,607						861,607		
SYD SYDNEY	31	846,076	689,091	22.8				846,076	689,091	22.8
IST ISTANBUL	32	795,149	489,920	62.3				795,149	489,920	62.3
SVO MOSCA/SHEREMETYEVO	33	788,511	424,393	85.8				788,511	424,393	85.8
ATH ATENE	34	787,733	677,293	16.3	321,868	410,576	-21.6	465,865	266,717	74.7
MIA MIAMI	35	754,571	604,205	24.9				754,571	604,205	24.9
BKK BANGKOK	36	710,677	456,282	55.8				710,677	456,282	55.8
CCS CARACAS	37	687,382	830,240	-17.2				687,382	830,240	-17.2
BCN BARCELLONA	38	622,649	148,211	320.1		200	-100.0	622,649	148,011	320.7
ZRH ZURIGO	39	607,439	146,425	314.8				607,439	146,425	314.8
DAC DHAKA	40	599,327	172,368	247.7				599,327	172,368	247.7
..X DIVERSI	41	13,463,326	12,918,038	4.2	937,627	2,252,524	-58.4	12,525,699	10,665,514	17.4
	TOT.	123,052,848	104,398,215	17.9	6,666,397	10,277,966	-35.1	116,386,451	94,120,249	23.7

Dati Mensili del mese di MAGGIO 2000

MOVIMENTI AEREI

SCALO DI	POS. 2000	SISTEMA 2000	SISTEMA 1999	SISTEMA Var.%	LINATE 2000	LINATE 1999	LINATE Var.%	MALPENSA 2000	MALPENSA 1999	MALPENSA Var.%
ROM ROMA	1	3,338	3,021	10.5	2,367	2,136	10.8	971	885	9.7
LON LONDRA	2	1,611	1,347	19.6	534	609	-12.3	1,077	738	45.9
PAR PARIGI	3	1,061	1,041	1.9	245	397	-38.3	816	644	26.7
CTA CATANIA	4	1,018	768	32.6	125	124	0.8	893	644	38.7
NAP NAPOLI	5	974	716	36.0	178	166	7.2	796	550	44.7
PMO PALERMO	6	733	604	21.4	63	114	-44.7	670	490	36.7
BRU BRUSSELS	7	732	639	14.6	176	323	-45.5	556	316	75.9
FRA FRANCOFORTE	8	691	719	-3.9	62	518	-88.0	629	201	212.9
AMS AMSTERDAM	9	594	622	-4.5	122	248	-50.8	472	374	26.2
MAD MADRID	10	593	488	21.5	62	155	-60.0	531	333	59.5
ZRH ZURIGO	11	551	478	15.3				551	478	15.3
BRI BARI	12	477	240	98.7	124	116	6.9	353	124	184.7
ATH ATENE	13	447	265	68.7	63	62	1.6	384	203	89.2
MUC MONACO	14	425	435	-2.3				425	435	-2.3
DUS DUSSELDORF	15	409	342	19.6				409	342	19.6
BCN BARCELLONA	16	376	360	4.4	1			375	360	4.2
CPH COPENHAGEN	17	371	366	1.4		93	-100.0	371	273	35.9
HAM AMBURGO	18	352	270	30.4				352	270	30.4
LYS LIONE	19	345	332	3.9				345	332	3.9
NEW NEW YORK	20	341	265	28.7				341	265	28.7
STR STOCCARDA	21	335	340	-1.5				335	340	-1.5
CAG CAGLIARI	22	317	258	22.9	62	188	-67.0	255	70	264.3
VIE VIENNA	23	308	287	7.3		156	-100.0	308	131	135.1
BLQ BOLOGNA	24	276	313	-11.8	2	1	100.0	274	312	-12.2
PSA PISA	25	264	247	6.9		7	-100.0	264	240	10.0
TRS TRIESTE	26	250	259	-3.5		6	-100.0	250	253	-1.2
VCE VENEZIA	27	250	251	-0.4				250	251	-0.4
FLR FIRENZE	28	247	302	-18.2				247	302	-18.2
BER BERLINO	29	246	192	28.1				246	192	28.1
STO STOCCOLMA	30	245	245			93	-100.0	245	152	61.2
GOA GENOVA	31	242	223	8.5				242	223	8.5
CGN COLONIA	32	218	200	9.0				218	200	9.0
TLV TEL AVIV	33	213	170	25.3				213	170	25.3
OLB OLBIA	34	206	213	-3.3		20	-100.0	206	193	6.7
HAJ HANOVER	35	203	192	5.7				203	192	5.7
BHX BIRMINGHAM	36	193	138	39.9		138	-100.0	193		
NCE NIZZA	37	189	186	1.6		1	-100.0	189	185	2.2
SSH SHARM EL SHEIKH	38	189	190	-0.5		24	-100.0	189	166	13.9
GVA GINEVRA	39	186	181	2.8				186	181	2.8
REG REGGIO C.	40	186	184	1.1	62	62		124	122	1.6
..X DIVERSI	41	6,780	5,878	15.3	315	396	-20.5	6,465	5,482	17.9
	TOT.	26,982	23,767	13.5	4,563	6,153	-25.8	22,419	17,614	27.3

LE PRINCIPALI RELAZIONI DI MILANO
Dati Mensili del mese di MAGGIO 2000

PASSEGGERI (A+P)

SCALO DI	POS. 2000	SISTEMA 2000	SISTEMA 1999	SISTEMA Var.%	LINATE 2000	LINATE 1999	LINATE Var.%	MALPENSA 2000	MALPENSA 1999	MALPENSA Var.%
ROM ROMA	1	333,122	292,338	14.0	254,121	230,014	10.5	79,001	62,324	26.8
LON LONDRA	2	141,353	130,485	8.3	55,960	65,954	-15.2	85,393	64,531	32.3
NAP NAPOLI	3	112,317	78,851	42.4	20,370	21,915	-7.0	91,947	56,936	61.5
CTA CATANIA	4	105,576	68,406	54.3	17,172	13,817	24.3	88,404	54,589	61.9
PAR PARIGI	5	100,521	98,552	2.0	25,163	42,008	-40.1	75,358	56,544	33.3
PMO PALERMO	6	70,156	50,879	37.9	7,507	13,436	-44.1	62,649	37,443	67.3
MAD MADRID	7	62,227	49,298	26.2	8,969	21,287	-57.9	53,258	28,011	90.1
FRA FRANCOFORTE	8	60,649	56,748	6.9	4,600	45,148	-89.8	56,049	11,600	383.2
NEW NEW YORK	9	58,716	47,362	24.0				58,716	47,362	24.0
AMS AMSTERDAM	10	54,736	55,024	-0.5	10,564	25,491	-58.6	44,172	29,533	49.6
BRI BARI	11	51,546	29,910	72.3	13,447	12,886	4.4	38,099	17,024	123.8
BRU BRUSSELS	12	47,411	44,342	6.9	12,031	23,706	-49.2	35,380	20,636	71.4
ATH ATENE	13	38,862	30,609	27.0	4,968	8,409	-40.9	33,894	22,200	52.7
BCN BARCELLONA	14	38,284	34,222	11.9				38,284	34,222	11.9
TLV TEL AVIV	15	33,483	24,012	39.4				33,483	24,012	39.4
SSH SHARM EL SHEIKH	16	31,404	32,750	-4.1		3,853	-100.0	31,404	28,897	8.7
ZRH ZURIGO	17	30,855	26,526	16.3				30,855	26,526	16.3
CAG CAGLIARI	18	29,153	26,250	11.1	6,249	19,706	-68.3	22,904	6,544	250.0
DUS DUSSELDORF	19	28,834	22,409	28.7				28,834	22,409	28.7
CPH COPENHAGEN	20	25,928	21,442	20.9		8,147	-100.0	25,928	13,295	95.0
ORD CHICAGO	21	23,614	21,403	10.3				23,614	21,403	10.3
MUC MONACO	22	23,109	24,354	-5.1				23,109	24,354	-5.1
VCE VENEZIA	23	22,172	17,836	24.3				22,172	17,836	24.3
VIE VIENNA	24	21,359	17,402	22.7		10,129	-100.0	21,359	7,273	193.7
REG REGGIO C.	25	20,113	16,115	24.8	5,500	5,786	-4.9	14,613	10,329	41.5
NRT NARITA TOKYO	26	19,920	17,465	14.1				19,920	17,465	14.1
OLB OLBIA	27	19,797	19,345	2.3		1,570	-100.0	19,797	17,775	11.4
STO STOCCOLMA	28	18,022	14,851	21.4		5,058	-100.0	18,022	9,793	84.0
LIS LISBONA	29	17,055	17,725	-3.8		6,096	-100.0	17,055	11,629	46.7
PSA PISA	30	16,600	11,454	44.9		36	-100.0	16,600	11,418	45.4
FLR FIRENZE	31	16,319	13,636	19.7				16,319	13,636	19.7
BER BERLINO	32	15,280	11,131	37.3				15,280	11,131	37.3
BDS BRINDISI	33	15,145	13,349	13.5	3,627			11,518	13,349	-13.7
IAD WASHINGTON	34	14,994	11,667	28.5				14,994	11,667	28.5
CUN CANCUN	35	14,930	8,593	73.7				14,930	8,593	73.7
SUF LAMEZIA S.EUFEMIA	36	14,349	13,495	6.3				14,349	13,495	6.3
IST ISTANBUL	37	14,042	9,152	53.4				14,042	9,152	53.4
HAM AMBURGO	38	13,681	10,425	31.2				13,681	10,425	31.2
DTW DETROIT	39	13,668						13,668		
CAI CAIRO	40	12,815	11,792	8.7				12,815	11,792	8.7
..X DIVERSI	41	569,762	461,068	23.6	6,989	28,653	-75.6	562,773	432,415	30.1
	TOT.	2,371,879	1,962,673	20.8	457,237	613,105	-25.4	1,914,642	1,349,568	41.9

Dati Mensili del mese di MAGGIO 2000

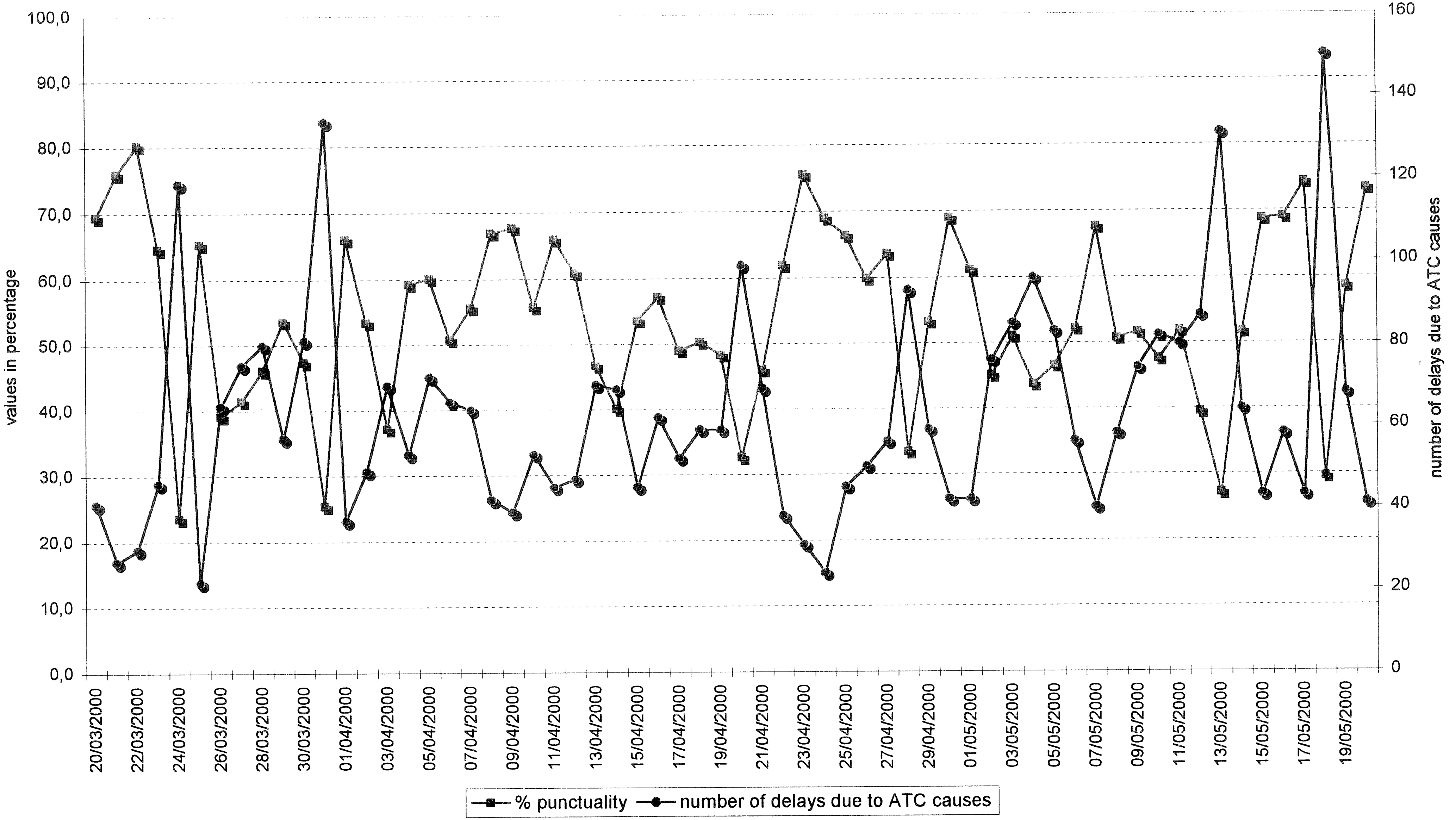
		MERCE (Kg)								
		SISTEMA			LINATE			MALPENSA		
SCALO DI	POS. 2000	2000	1999	Var.%	2000	1999	Var.%	2000	1999	Var.%
NEW NEW YORK	1	3,737,442	3,294,915	13.4				3,737,442	3,294,915	13.4
ORD CHICAGO	2	2,588,026	2,063,194	25.4				2,588,026	2,063,194	25.4
NRT NARITA TOKYO	3	1,391,887	1,225,860	13.5				1,391,887	1,225,860	13.5
LAX LOS ANGELES	4	1,017,672	1,023,078	-0.5				1,017,672	1,023,078	-0.5
LON LONDRA	5	988,980	1,134,329	-12.8	121,238	697,894	-82.6	867,742	436,435	98.8
AMS AMSTERDAM	6	966,910	830,725	16.4	4,912	104,674	-95.3	961,998	726,051	32.5
KIX OSAKA KANSAI INTL	7	798,903	905,517	-11.8				798,903	905,517	-11.8
PEK PEKING	8	739,228	444,430	66.3				739,228	444,430	66.3
SEL SEOUL	9	730,262	793,869	-8.0				730,262	793,869	-8.0
DXB DUBAI	10	644,732	496,646	29.8				644,732	496,646	29.8
DEL DELHI	11	620,119	417,417	48.6				620,119	417,417	48.6
JNB JOHANNESBURG	12	619,610	784,877	-21.1				619,610	784,877	-21.1
HKG HONGKONG	13	614,910	558,176	10.2				614,910	558,176	10.2
ROM ROMA	14	574,449	630,455	-8.9	94,960	98,822	-3.9	479,489	531,633	-9.8
BOM MUMBAI	15	558,012	614,741	-9.2				558,012	614,741	-9.2
PAR PARIGI	16	512,481	448,103	14.4	60,441	140,527	-57.0	452,040	307,576	47.0
MAA MADRAS	17	508,171	821,302	-38.1				508,171	821,302	-38.1
IAD WASHINGTON	18	476,708	313,727	51.9				476,708	313,727	51.9
PVG SHANGHAI	19	381,147						381,147		
ATL ATLANTA	20	364,218	300,811	21.1				364,218	300,811	21.1
BOS BOSTON	21	311,719	361,607	-13.8				311,719	361,607	-13.8
YYZ TORONTO	22	292,928						292,928		
SFO SAN FRANCISCO	23	282,581	50,333	461.4				282,581	50,333	461.4
DTW DETROIT	24	280,981						280,981		
DKR DAKAR	25	219,652	225,089	-2.4				219,652	225,089	-2.4
GRU SAN PAOLO	26	207,894	286,095	-27.3				207,894	286,095	-27.3
MIA MIAMI	27	200,255	141,134	41.9				200,255	141,134	41.9
MAD MADRID	28	191,995	176,567	8.7	22,959	133,387	-82.8	169,036	43,180	291.5
BKK BANGKOK	29	183,192	142,172	28.9				183,192	142,172	28.9
IST ISTANBUL	30	176,334	110,427	59.7				176,334	110,427	59.7
DAC DHAKA	31	152,428	92,966	64.0				152,428	92,966	64.0
ZRH ZURIGO	32	150,626	56,854	164.9				150,626	56,854	164.9
SVO MOSCA/SHEREMETYEVO	33	148,563	90,397	64.3				148,563	90,397	64.3
SYD SYDNEY	34	147,456	128,813	14.5				147,456	128,813	14.5
TAS TASHKENT	35	143,406	92,663	54.8				143,406	92,663	54.8
ATH ATENE	36	137,396	181,638	-24.4	61,649	86,649	-28.9	75,747	94,989	-20.3
CMN CASABLANCA	37	135,972	94,121	44.5				135,972	94,121	44.5
BCN BARCELLONA	38	132,716	48,719	172.4				132,716	48,719	172.4
TUN TUNISI	39	132,493	53,139	149.3				132,493	53,139	149.3
CAI CAIRO	40	125,949	160,855	-21.7				125,949	160,855	-21.7
..X DIVERSI	41	2,588,773	3,573,057	-27.5	107,389	886,704	-87.9	2,481,384	2,686,353	-7.6
	TOT.	25,177,176	23,168,818	8.7	473,548	2,148,657	-78.0	24,703,628	21,020,161	17.5

Annex 7 Airport Punctuality Data for Malpensa

Airport Punctuality - MALPENSA -

Percentage of flights departed on time out of the total departures versus number of delays due to ATC

Daily values - Period 20th March - 20th May 2000



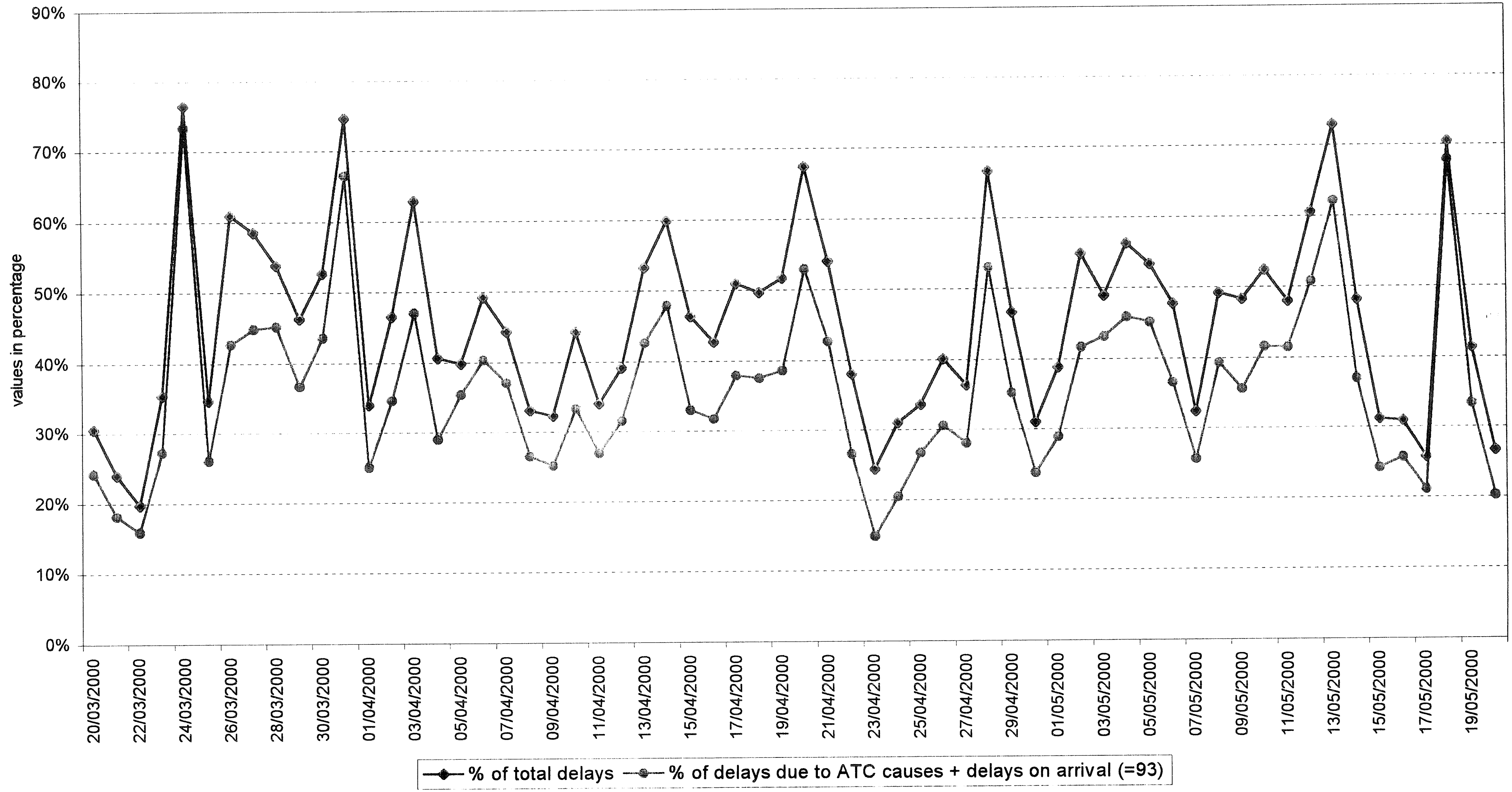
Airport Punctuality - MALPENSA -

Percentage of delayed flights out of the total departures

versus

percentage of delays due to ATC and delays on arrival (=93) out of the total departures

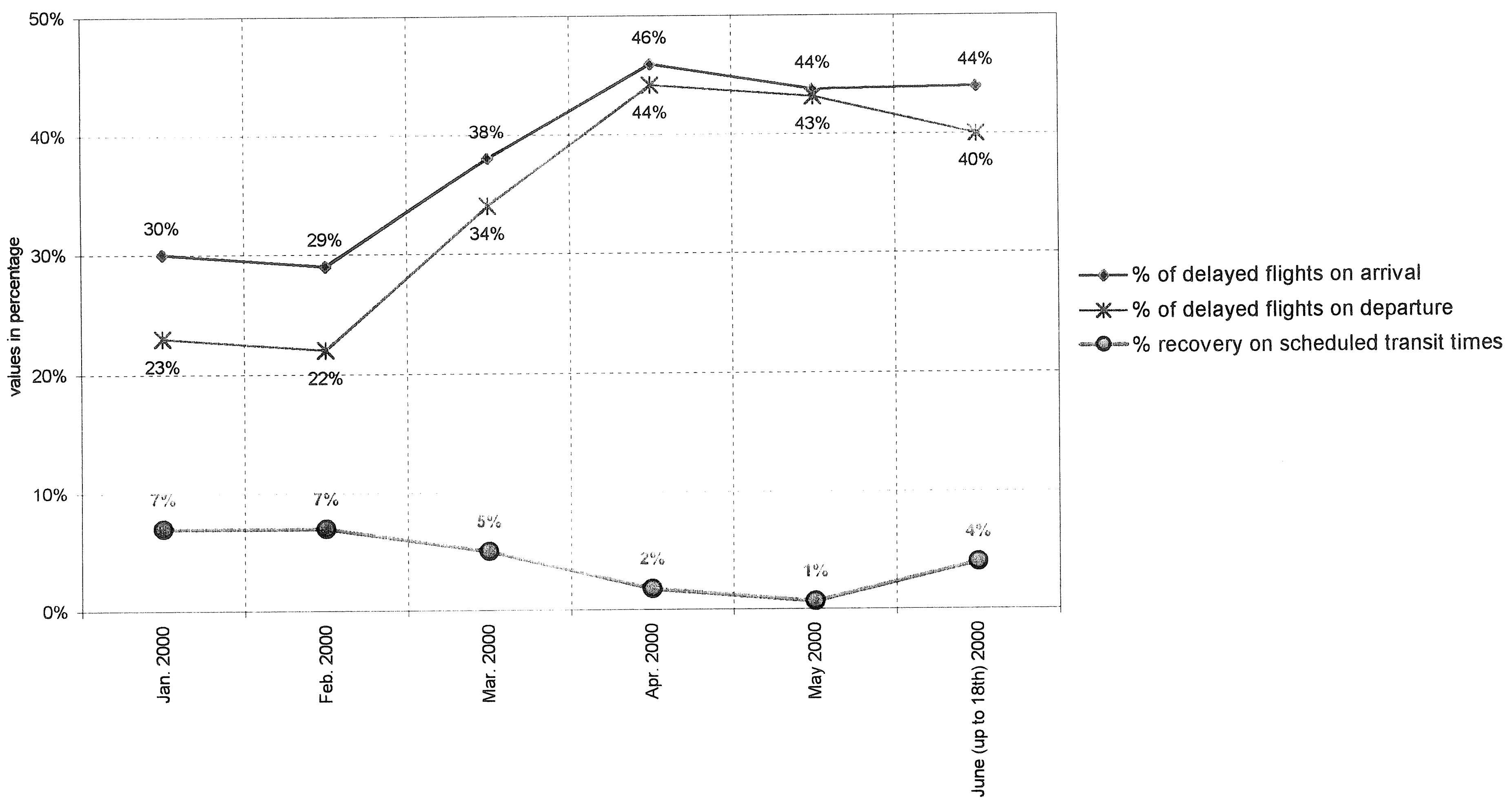
Daily values - Period 20th March - 20th May 2000



Re-departures time make-up on late arriving flights - MALPENSA -

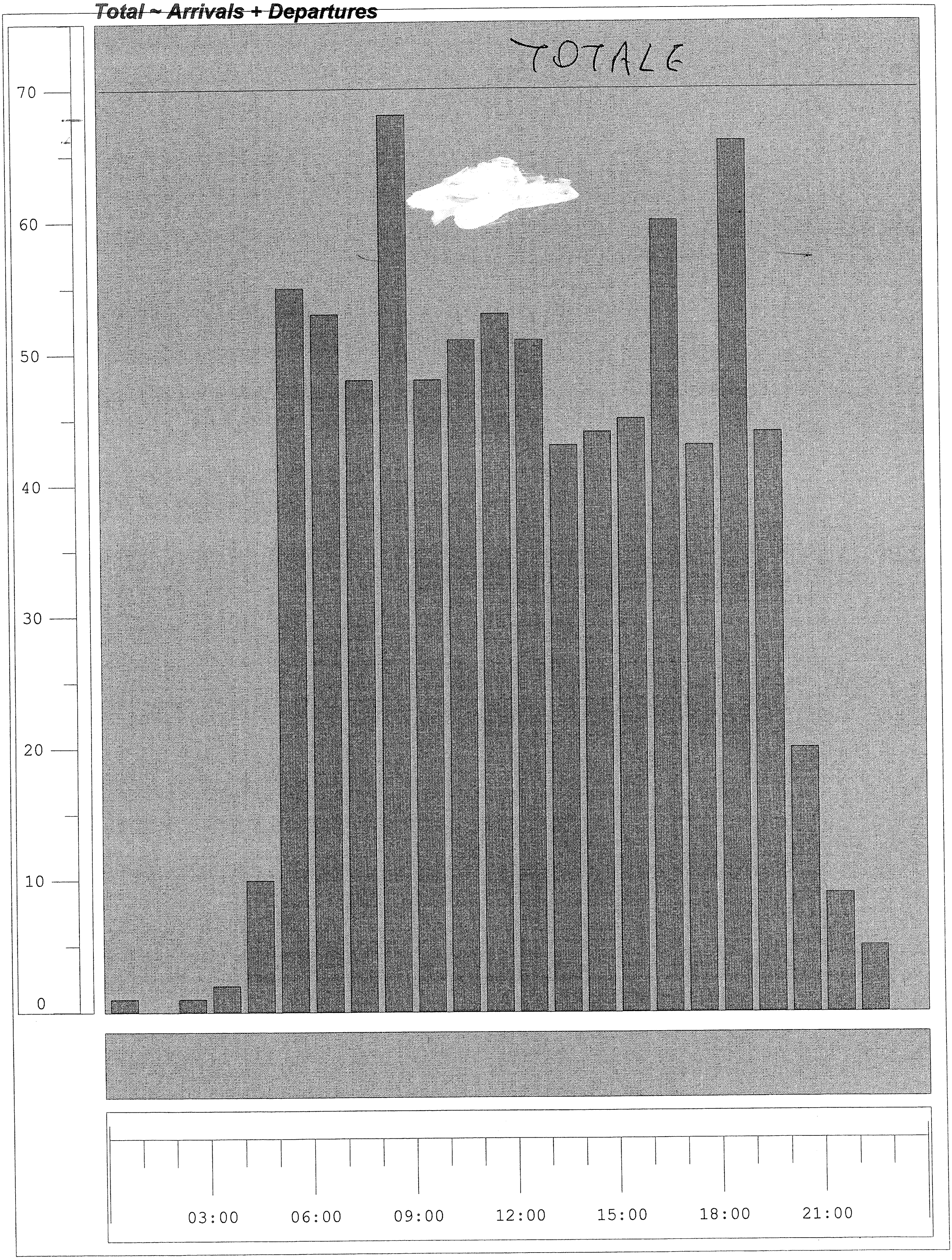
% difference between the % of the delayed flights on arrival ad the % of the delayed fligths on departure

Monthly average values - Period January - June (up to 18th) 2000

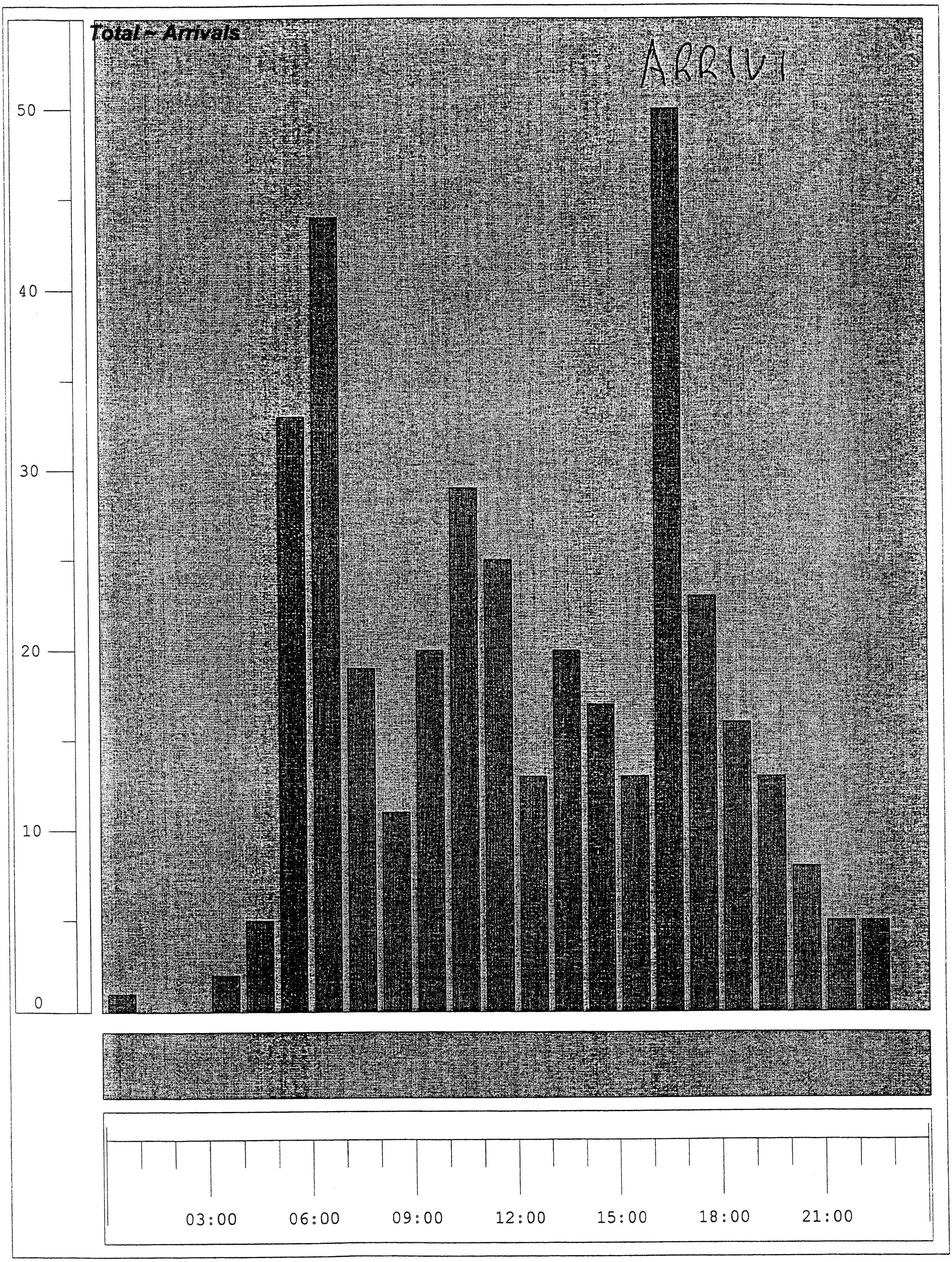


Annex 8 Filed Demand at Malpensa, 12th June 2000

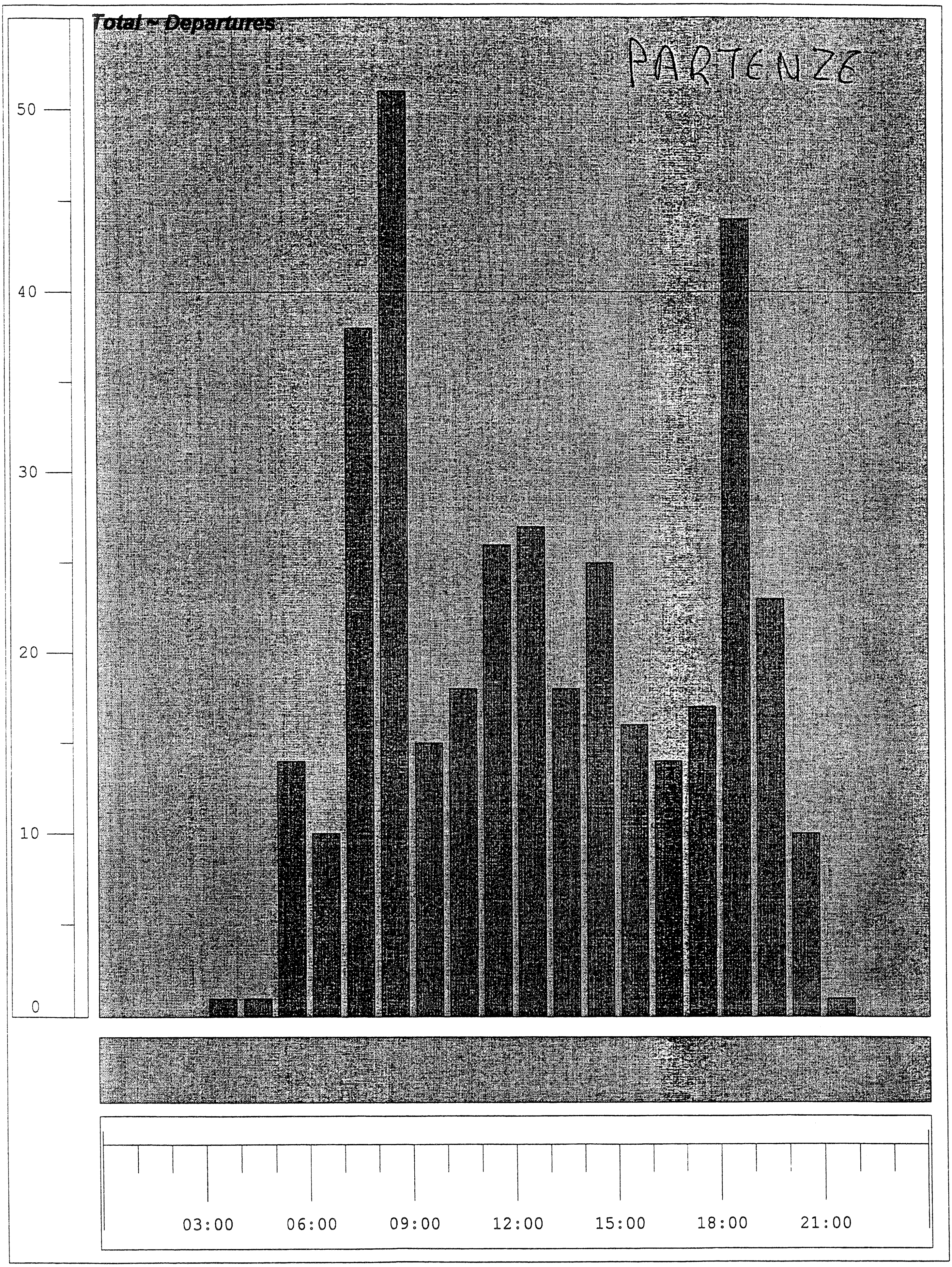
AD LIMC G Counts
Filed Demand
Observed period: 00:00 - 24:00, Mon 12 Jun 2000



AD LIMC A Counts
Filed Demand
Observed period: 00:00 - 24:00, Fri 16 Jun 2000



AD LIMC D Counts
Filed Demand
Observed period: 00:00 - 24:00, Thu 8 Jun 2000



Annex 9 Slot Allocation Data for Malpensa

Statistics from Accepted Database(s)
Carriers: All Airport: MXP Season: S00
Date range: 11SEP - 17SEP Time range: 0000 - 2355

Date/Time	Runway Arr	Dep	Mov
11SEP			
11SEP			
00.00	1	0	1
01.00	0	0	0
02.00	0	0	0
03.00	0	0	0
04.00	3	3	6
05.00	33	26	59
06.00	42	24	66
07.00	30	39	69
08.00	21	40	61
09.00	24	28	52
10.00	36	22	58
11.00	30	29	59
12.00	25	35	60
13.00	28	22	50
14.00	23	26	49
15.00	23	27	50
16.00	37	23	60
17.00	33	32	65
18.00	22	40	62
19.00	22	23	45
20.00	13	9	22
21.00	2	3	5
22.00	4	1	5
23.00	3	0	3
12SEP			
12SEP			
00.00	3	0	3
01.00	1	0	1
02.00	1	0	1
03.00	0	2	2
04.00	3	4	7
05.00	31	22	53
06.00	40	24	64
07.00	28	39	67
08.00	9	37	46
09.00	21	14	35
10.00	36	21	57
11.00	24	31	55
12.00	19	31	50
13.00	22	14	36
14.00	18	25	43
15.00	21	20	41
16.00	33	20	53
17.00	36	30	66
18.00	18	38	56
19.00	21	21	42
20.00	12	5	17
21.00	4	3	7
22.00	1	0	1
23.00	2	0	2
13SEP			
13SEP			
00.00	1	0	1
01.00	0	0	0
02.00	1	0	1
03.00	0	2	2
04.00	3	6	9
05.00	29	22	51
06.00	41	21	62

Statistics from Accepted Database(s)
Carriers: All Airport: MXP Season: S00
Date range: 11SEP - 17SEP Time range: 0000 - 2355

Date/Time	Runway Arr	Dep	Mov
13SEP			
07.00	28	39	67
08.00	11	38	49
09.00	22	14	36
10.00	33	21	54
11.00	25	29	54
12.00	16	28	44
13.00	23	9	32
14.00	16	28	44
15.00	24	19	43
16.00	35	19	54
17.00	32	30	62
18.00	20	38	58
19.00	18	21	39
20.00	13	5	18
21.00	2	2	4
22.00	0	0	0
23.00	2	0	2
14SEP			

14SEP			
00.00	0	0	0
01.00	0	0	0
02.00	1	0	1
03.00	0	2	2
04.00	3	3	6
05.00	32	19	51
06.00	40	24	64
07.00	31	39	70
08.00	10	40	50
09.00	17	13	30
10.00	34	22	56
11.00	24	26	50
12.00	18	30	48
13.00	22	13	35
14.00	16	24	40
15.00	22	20	42
16.00	35	19	54
17.00	36	30	66
18.00	19	40	59
19.00	18	21	39
20.00	12	4	16
21.00	3	1	4
22.00	1	0	1
23.00	0	1	1
15SEP			

15SEP			
00.00	1	0	1
01.00	0	0	0
02.00	1	0	1
03.00	0	2	2
04.00	4	3	7
05.00	32	23	55
06.00	41	21	62
07.00	31	39	70
08.00	9	42	51
09.00	21	17	38
10.00	33	20	53
11.00	26	29	55
12.00	16	31	47
13.00	21	10	31
14.00	20	24	44
15.00	22	21	43
16.00	35	18	53
17.00	36	30	66

Statistics from Accepted Database(s)
Carriers: All Airport: MXP Season: S00
Date range: 11SEP - 17SEP Time range: 0000 - 2355

Date/Time	Runway Arr	Dep	Mov
15SEP			
18.00	18	40	58
19.00	19	18	37
20.00	9	5	14
21.00	4	0	4
22.00	2	0	2
23.00	1	0	1
16SEP			

Date/Time	Arr	Dep	Mov
16SEP			
00.00	0	0	0
01.00	1	0	1
02.00	0	0	0
03.00	0	0	0
04.00	3	7	10
05.00	28	20	48
06.00	40	23	63
07.00	29	39	68
08.00	12	41	53
09.00	19	17	36
10.00	38	18	56
11.00	24	29	53
12.00	17	27	44
13.00	19	11	30
14.00	15	24	39
15.00	19	18	37
16.00	35	21	56
17.00	33	29	62
18.00	13	36	49
19.00	15	17	32
20.00	10	5	15
21.00	3	0	3
22.00	0	0	0
23.00	4	0	4
17SEP			

Date/Time	Arr	Dep	Mov
17SEP			
00.00	2	0	2
01.00	2	1	3
02.00	0	0	0
03.00	1	0	1
04.00	3	2	5
05.00	28	19	47
06.00	36	20	56
07.00	24	37	61
08.00	11	37	48
09.00	25	13	38
10.00	33	25	58
11.00	24	28	52
12.00	18	36	54
13.00	24	13	37
14.00	23	22	45
15.00	26	22	48
16.00	35	23	58
17.00	35	33	68
18.00	23	40	63
19.00	21	23	44
20.00	10	9	19
21.00	4	0	4
22.00	2	0	2
23.00	4	0	4

Statistics from Accepted Database(s)
Carriers: All Airport: MXP Season: S00
Date range: 11SEP - 17SEP Time range: 0000 - 2355

	Runway		
Date/Time	Arr	Dep	Mov
11SEP	455	452	907
12SEP	404	401	805
13SEP	395	391	786
14SEP	394	391	785
15SEP	402	393	795
16SEP	377	382	759
17SEP	414	403	817

Statistics from Accepted Database(s)
Carriers: All Airport: MXP Season: W00
Date range: 12MAR - 18MAR Time range: 0000 - 2355

Date/Time	Runway Arr	Dep	Mov
12MAR			
12MAR			
00.00	2	0	2
01.00	1	0	1
02.00	0	0	0
03.00	0	0	0
04.00	0	0	0
05.00	6	13	19
06.00	35	24	59
07.00	40	25	65
08.00	29	37	66
09.00	18	39	57
10.00	33	28	61
11.00	35	31	66
12.00	34	30	64
13.00	22	38	60
14.00	29	21	50
15.00	29	32	61
16.00	33	26	59
17.00	36	20	56
18.00	33	32	65
19.00	27	41	68
20.00	20	26	46
21.00	10	4	14
22.00	1	2	3
23.00	0	0	0
13MAR			
13MAR			
00.00	0	0	0
01.00	0	0	0
02.00	0	0	0
03.00	1	0	1
04.00	0	4	4
05.00	7	11	18
06.00	35	23	58
07.00	41	23	64
08.00	27	36	63
09.00	16	38	54
10.00	26	25	51
11.00	35	25	60
12.00	28	31	59
13.00	23	35	58
14.00	28	22	50
15.00	24	31	55
16.00	32	23	55
17.00	37	18	55
18.00	29	30	59
19.00	24	42	66
20.00	21	22	43
21.00	13	3	16
22.00	1	1	2
23.00	0	0	0
14MAR			
14MAR			
00.00	0	0	0
01.00	0	0	0
02.00	0	0	0
03.00	1	0	1
04.00	1	2	3
05.00	6	11	17
06.00	34	19	53

Statistics from Accepted Database(s)
Carriers: All Airport: MXP Season: W00
Date range: 12MAR - 18MAR Time range: 0000 - 2355

Date/Time	Runway Arr	Dep	Mov
14MAR			
07.00	41	23	64
08.00	27	36	63
09.00	17	36	53
10.00	28	24	52
11.00	32	27	59
12.00	26	26	52
13.00	21	33	54
14.00	30	21	51
15.00	24	31	55
16.00	31	24	55
17.00	34	17	51
18.00	29	30	59
19.00	21	41	62
20.00	21	23	44
21.00	10	3	13
22.00	1	1	2
23.00	0	0	0
15MAR			
15MAR			
00.00	0	0	0
01.00	0	0	0
02.00	0	0	0
03.00	1	0	1
04.00	0	2	2
05.00	6	11	17
06.00	35	21	56
07.00	39	23	62
08.00	30	36	66
09.00	14	38	52
10.00	26	22	48
11.00	33	27	60
12.00	28	28	56
13.00	22	36	58
14.00	27	19	46
15.00	22	30	52
16.00	28	23	51
17.00	37	17	54
18.00	30	31	61
19.00	22	42	64
20.00	20	21	41
21.00	10	3	13
22.00	1	1	2
23.00	0	0	0
16MAR			
16MAR			
00.00	0	0	0
01.00	0	0	0
02.00	0	0	0
03.00	1	0	1
04.00	1	2	3
05.00	6	11	17
06.00	35	22	57
07.00	42	22	64
08.00	27	38	65
09.00	17	37	54
10.00	27	25	52
11.00	31	26	57
12.00	26	27	53
13.00	20	32	52
14.00	27	18	45
15.00	26	31	57
16.00	32	24	56
17.00	37	19	56

Statistics from Accepted Database(s)
Carriers: All Airport: MXP Season: W00
Date range: 12MAR - 18MAR Time range: 0000 - 2355

Date/Time	Runway Arr	Dep	Mov
16MAR			
18.00	29	32	61
19.00	23	44	67
20.00	20	21	41
21.00	8	3	11
22.00	1	0	1
23.00	0	0	0
17MAR			
17MAR			
00.00	0	0	0
01.00	1	0	1
02.00	0	0	0
03.00	0	0	0
04.00	2	0	2
05.00	4	14	18
06.00	35	23	58
07.00	39	22	61
08.00	29	37	66
09.00	13	41	54
10.00	25	21	46
11.00	35	25	60
12.00	27	31	58
13.00	21	31	52
14.00	22	21	43
15.00	22	25	47
16.00	28	22	50
17.00	31	14	45
18.00	25	22	47
19.00	16	41	57
20.00	16	18	34
21.00	7	3	10
22.00	0	0	0
23.00	1	0	1
18MAR			
18MAR			
00.00	1	0	1
01.00	2	0	2
02.00	1	0	1
03.00	0	0	0
04.00	1	0	1
05.00	6	11	17
06.00	34	16	50
07.00	35	20	55
08.00	25	35	60
09.00	12	35	47
10.00	27	21	48
11.00	37	27	64
12.00	26	34	60
13.00	22	33	55
14.00	27	20	47
15.00	27	27	54
16.00	32	27	59
17.00	40	24	64
18.00	33	34	67
19.00	22	43	65
20.00	19	24	43
21.00	9	3	12
22.00	3	1	4
23.00	1	0	1

Statistics from Accepted Database(s)
Carriers: All Airport: MXP Season: W00
Date range: 12MAR - 18MAR Time range: 0000 - 2355

	Runway		
Date/Time	Arr	Dep	Mov
12MAR	473	469	942
13MAR	448	443	891
14MAR	435	428	863
15MAR	431	431	862
16MAR	436	434	870
17MAR	399	411	810
18MAR	442	435	877

Annex 10 Average Traffic Delay at European Airports

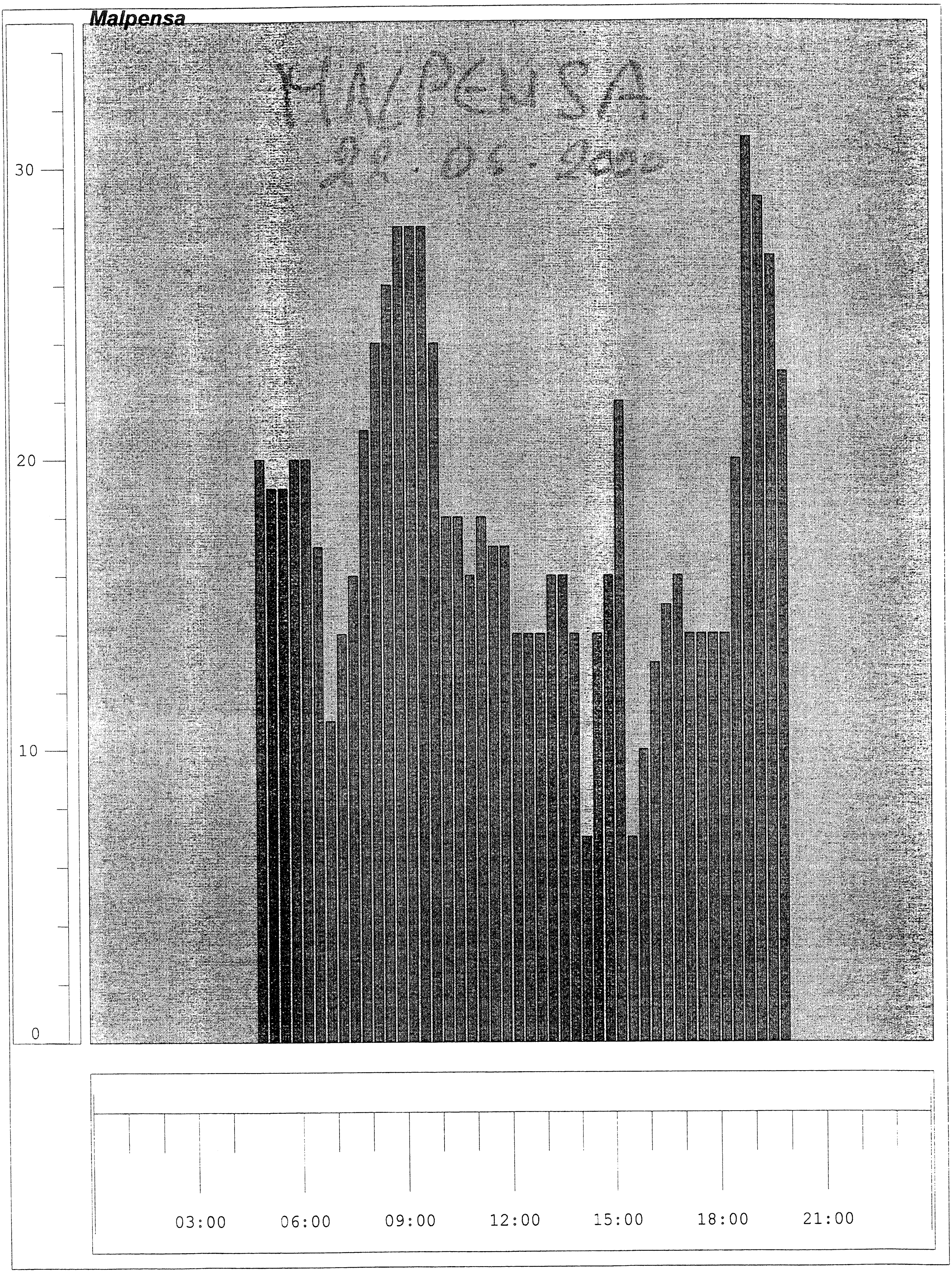
TACT Access

22-13:50 Updated

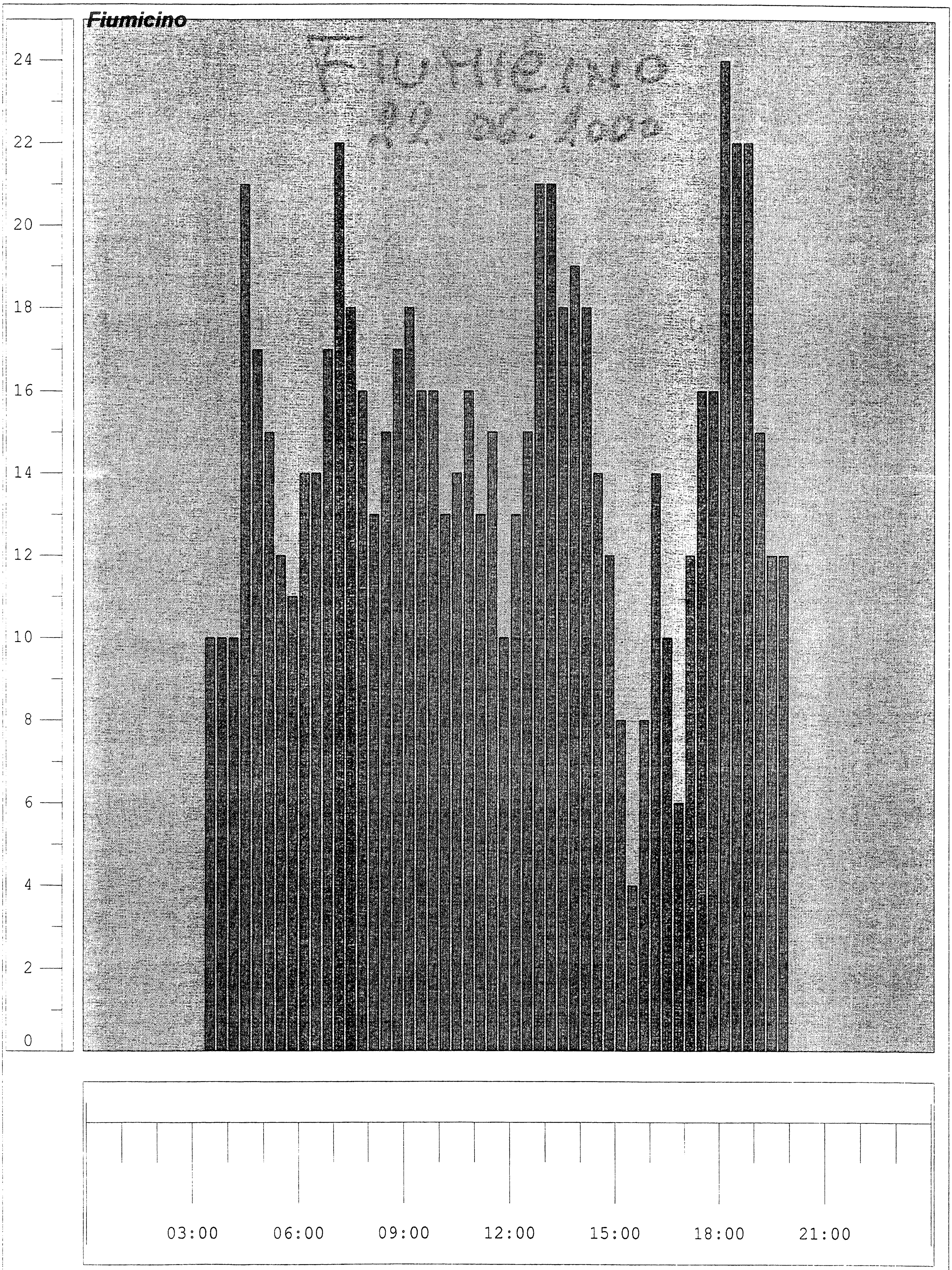
AD LIMC D Delays

Delayed Traffic average delay

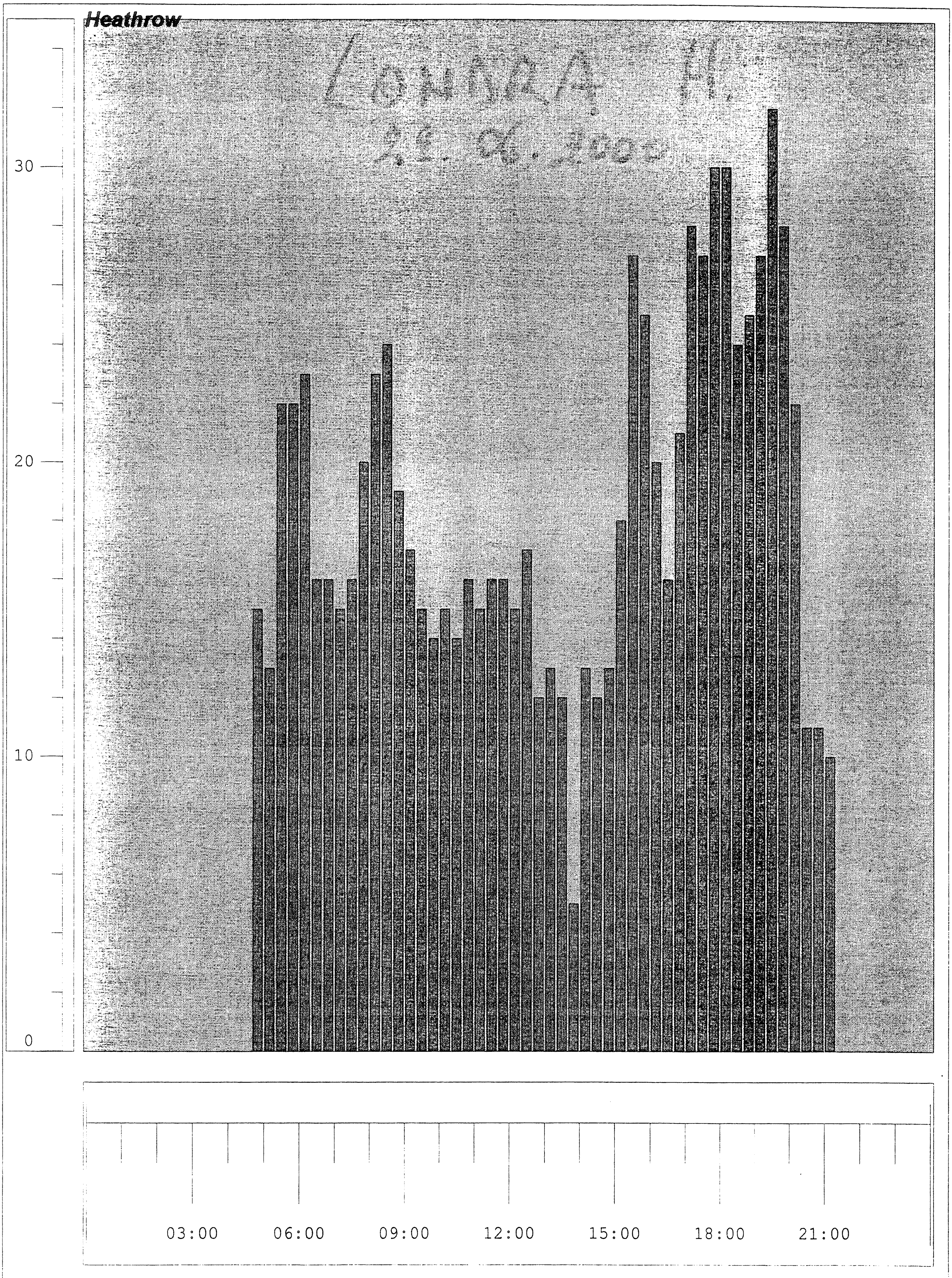
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



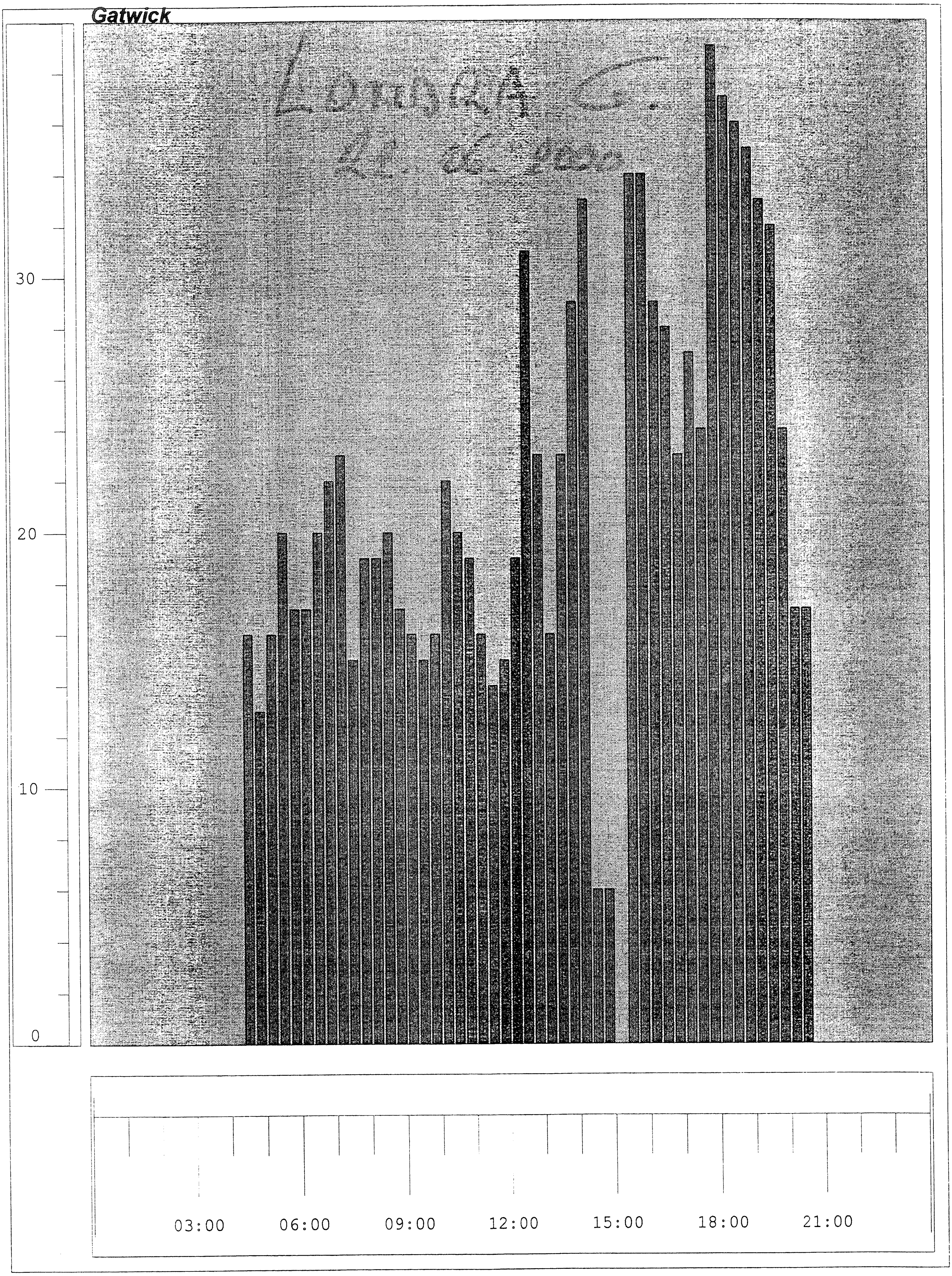
AD LIRF D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



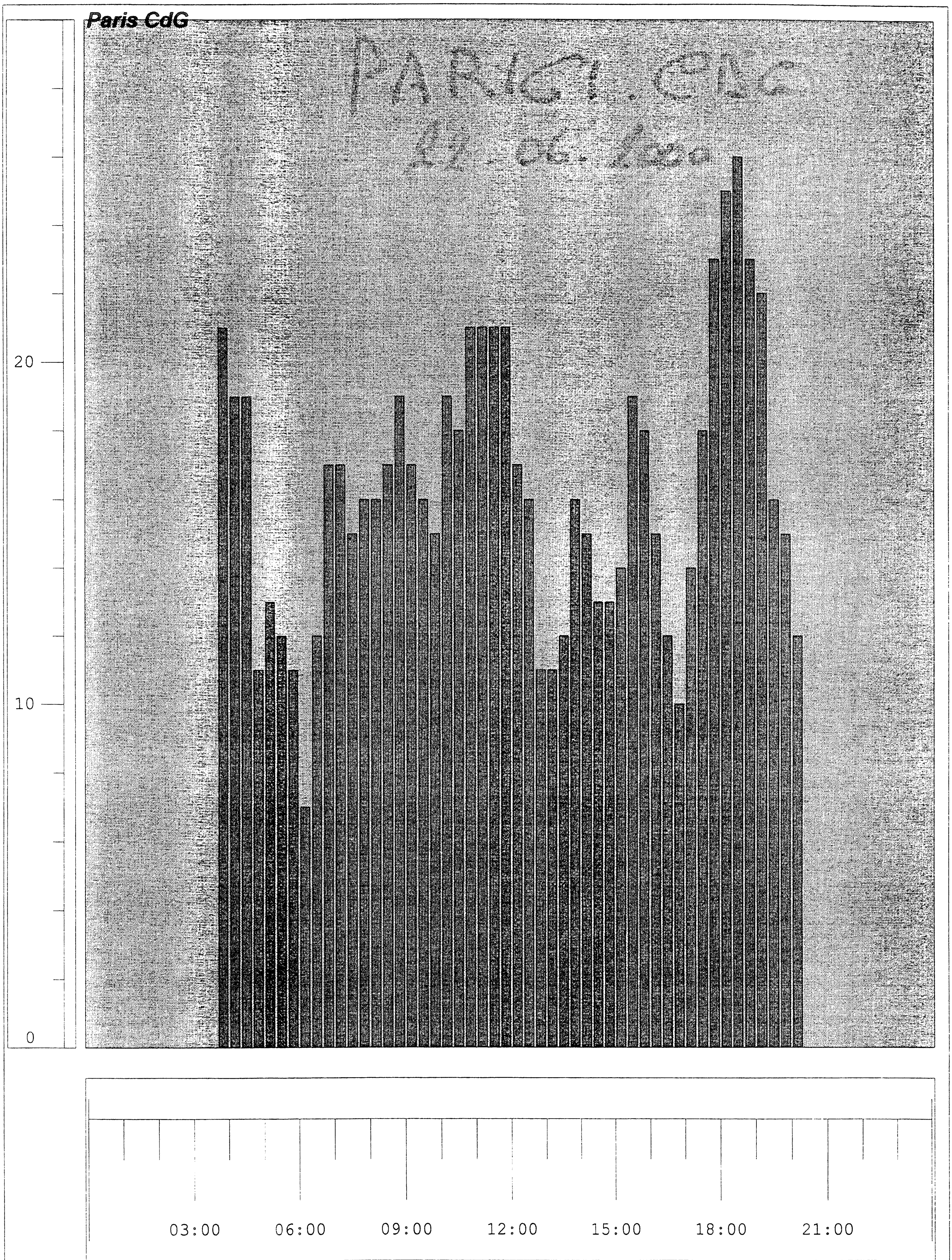
AD EGLL D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



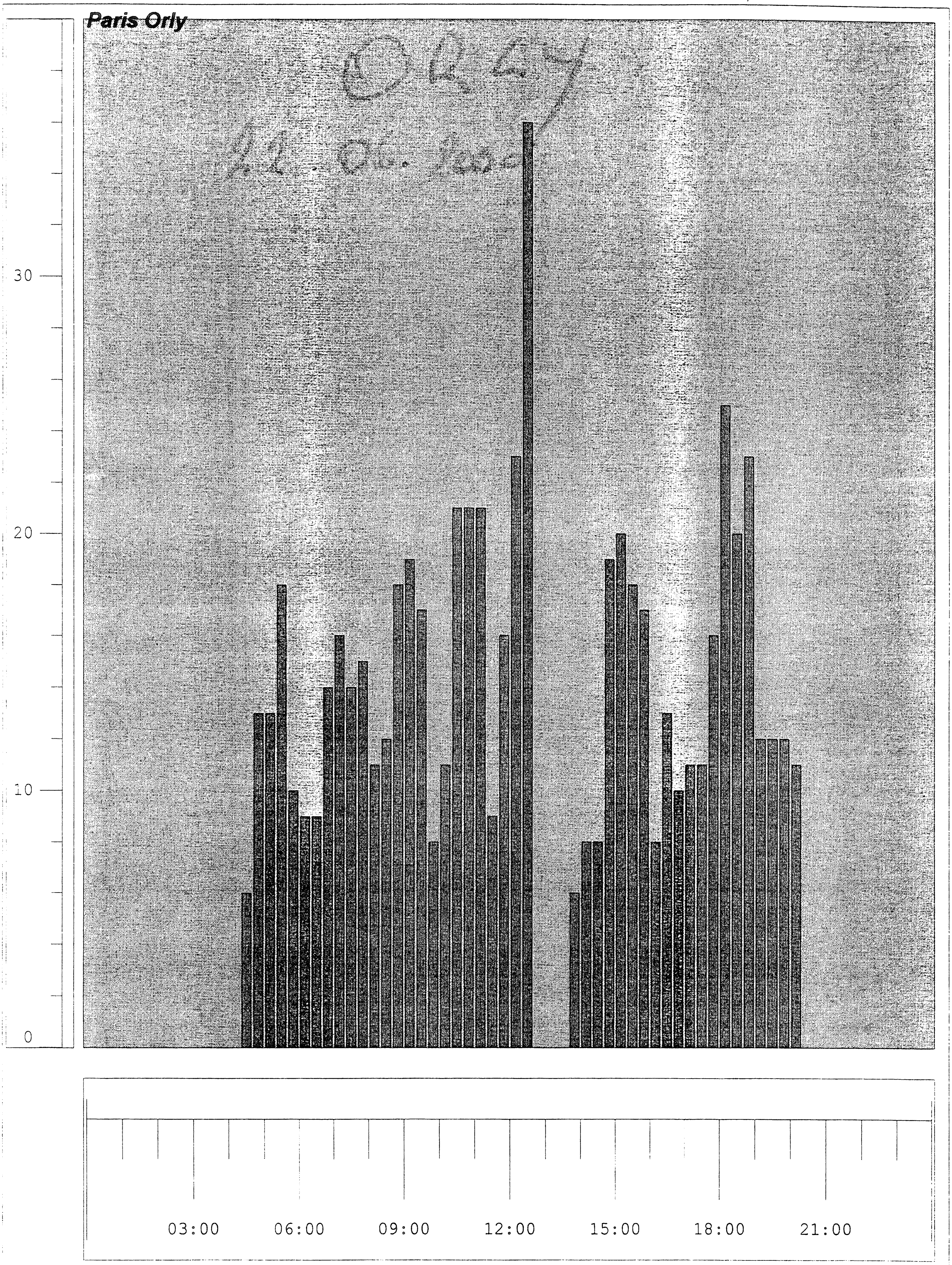
AD EGKK D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



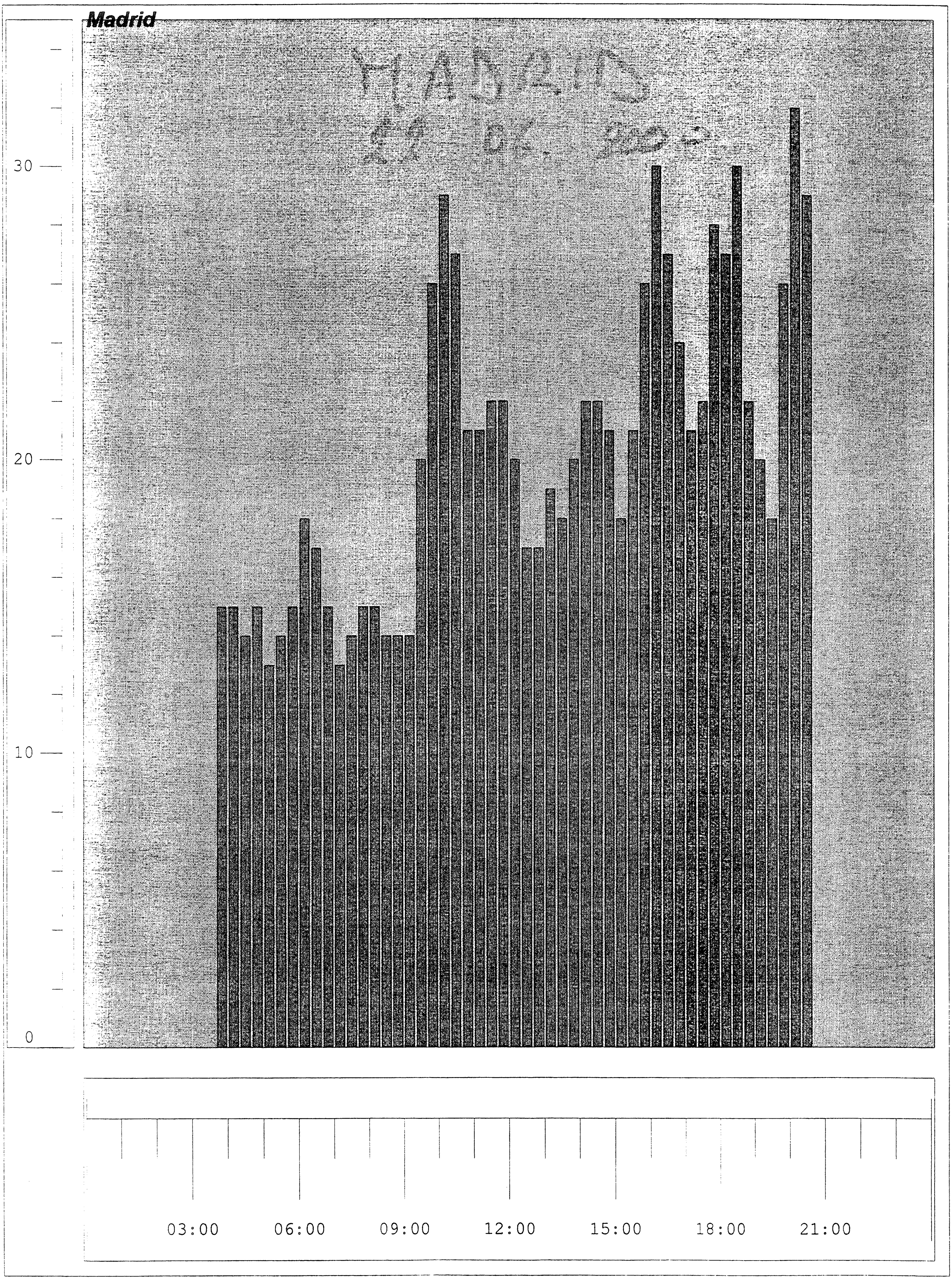
AD LFPG D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



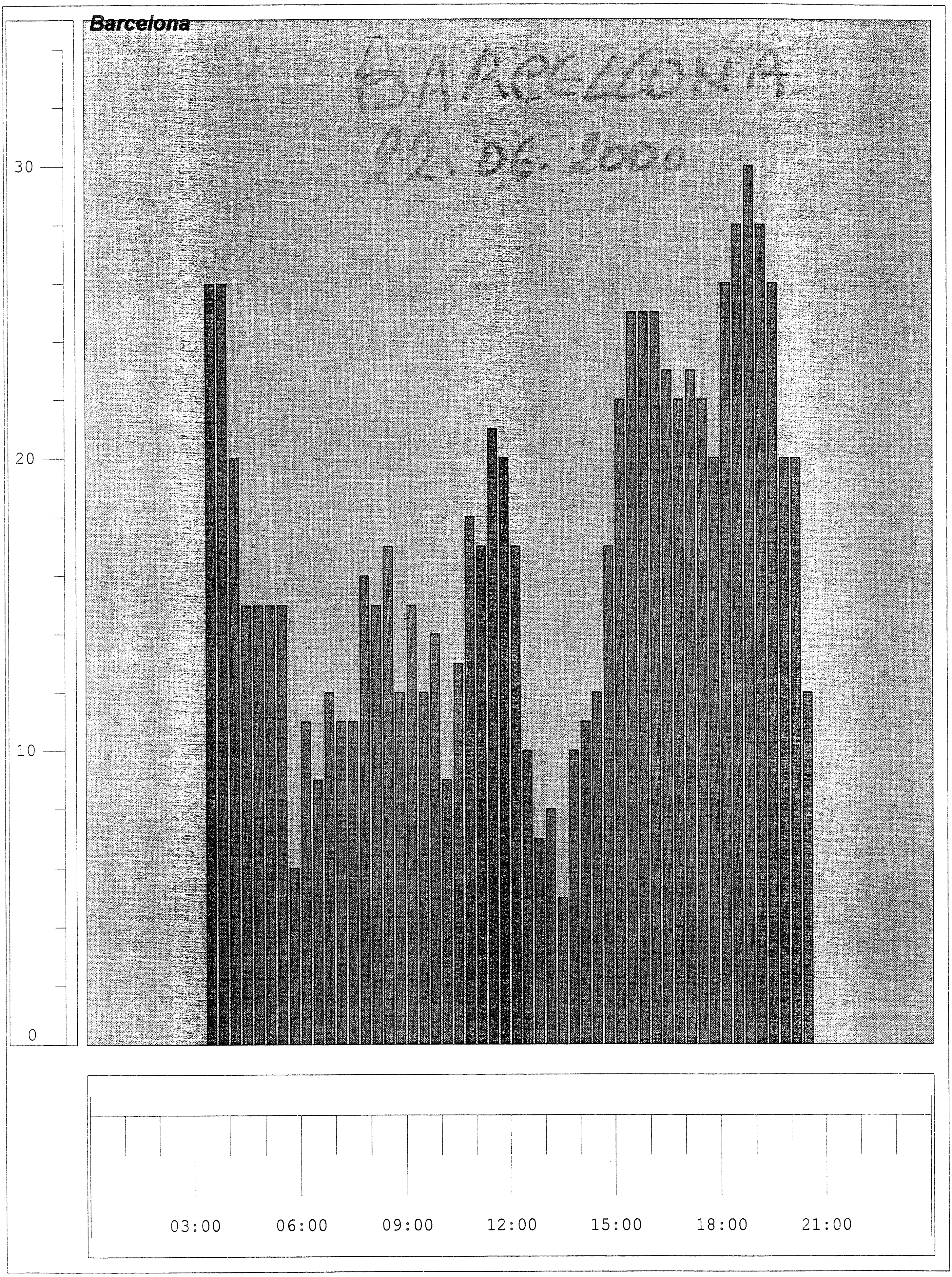
AD LFPO D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



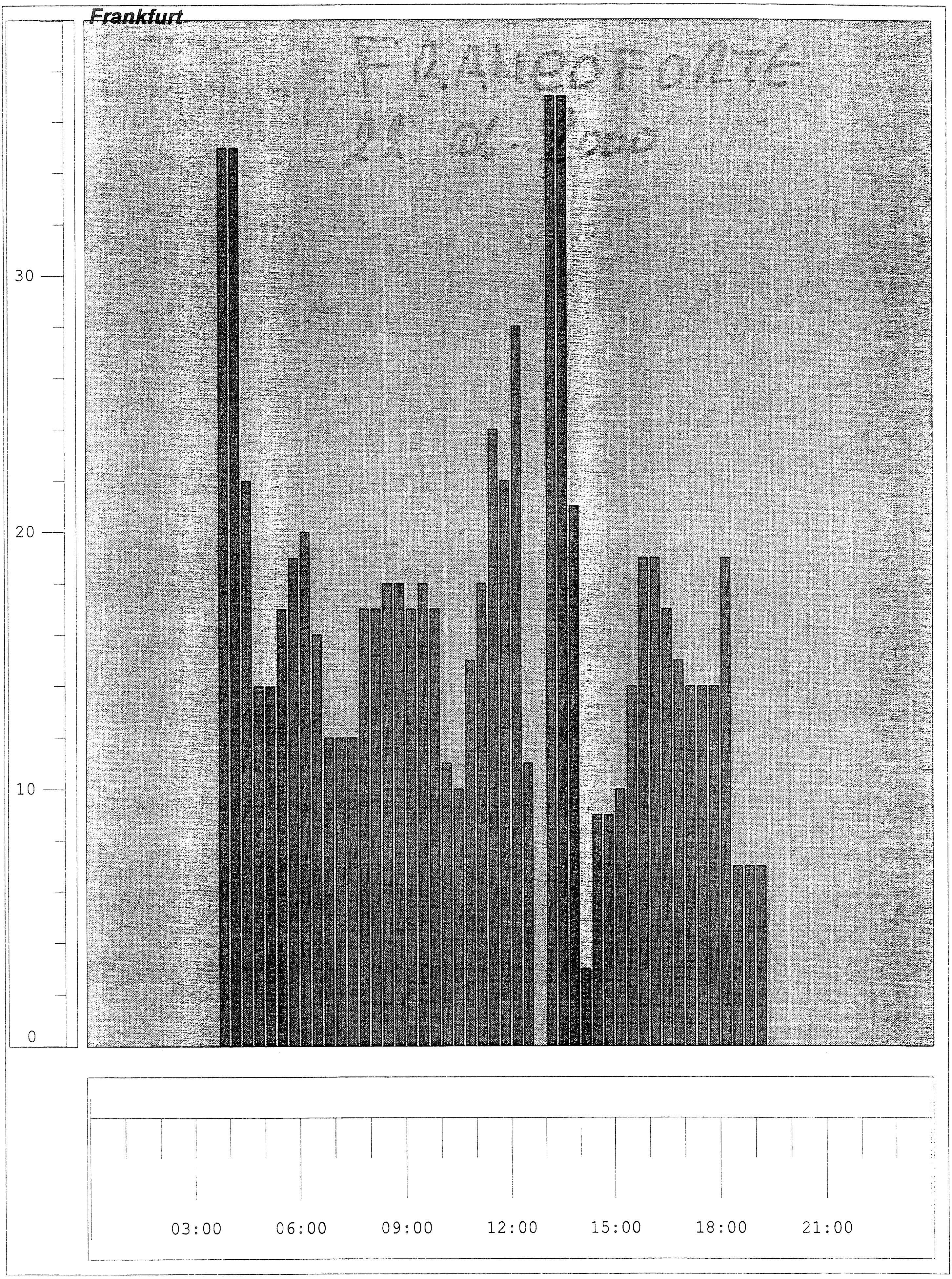
AD LEMD D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



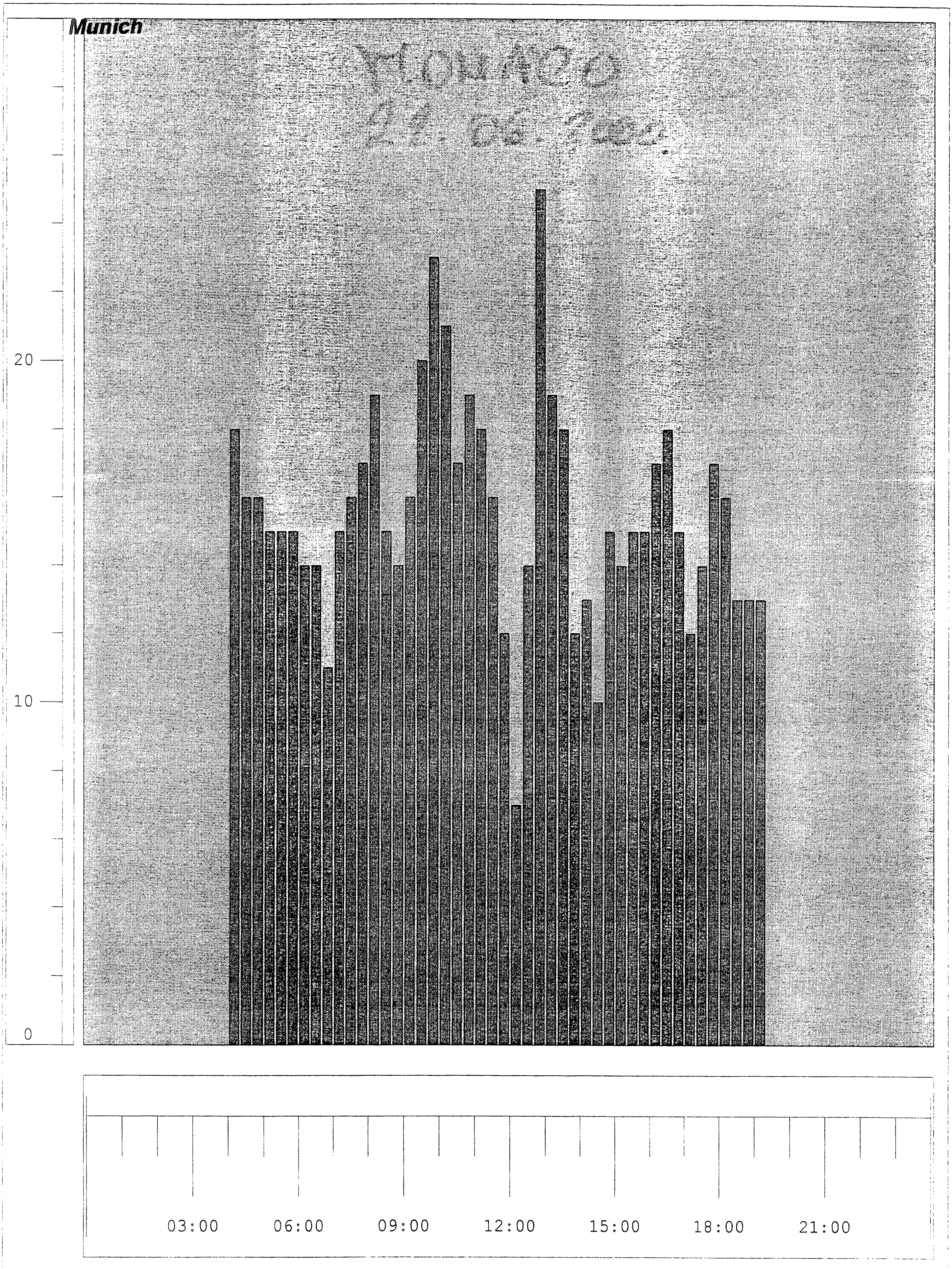
AD LEBL D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



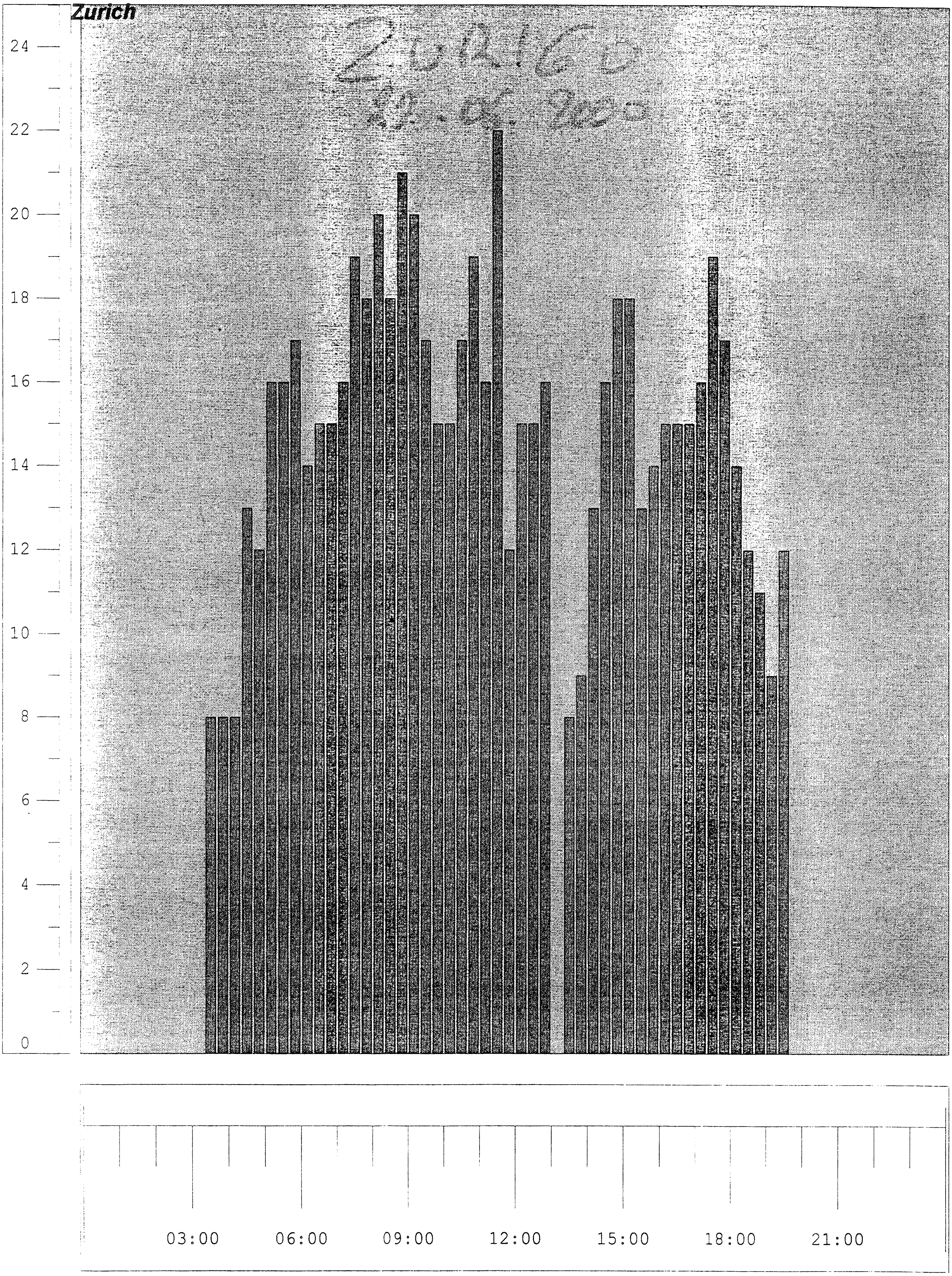
AD EDDF D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



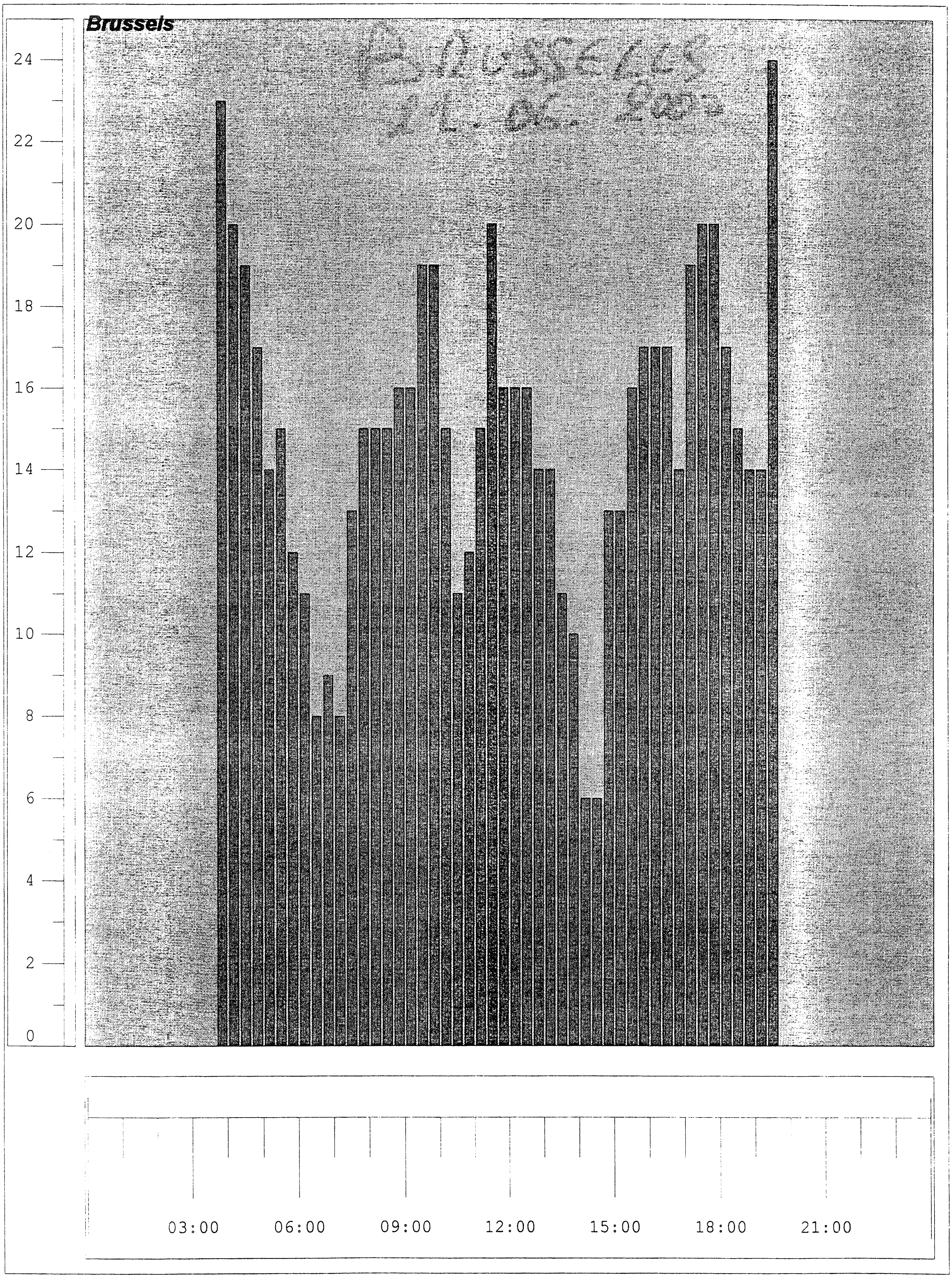
AD EDDM D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



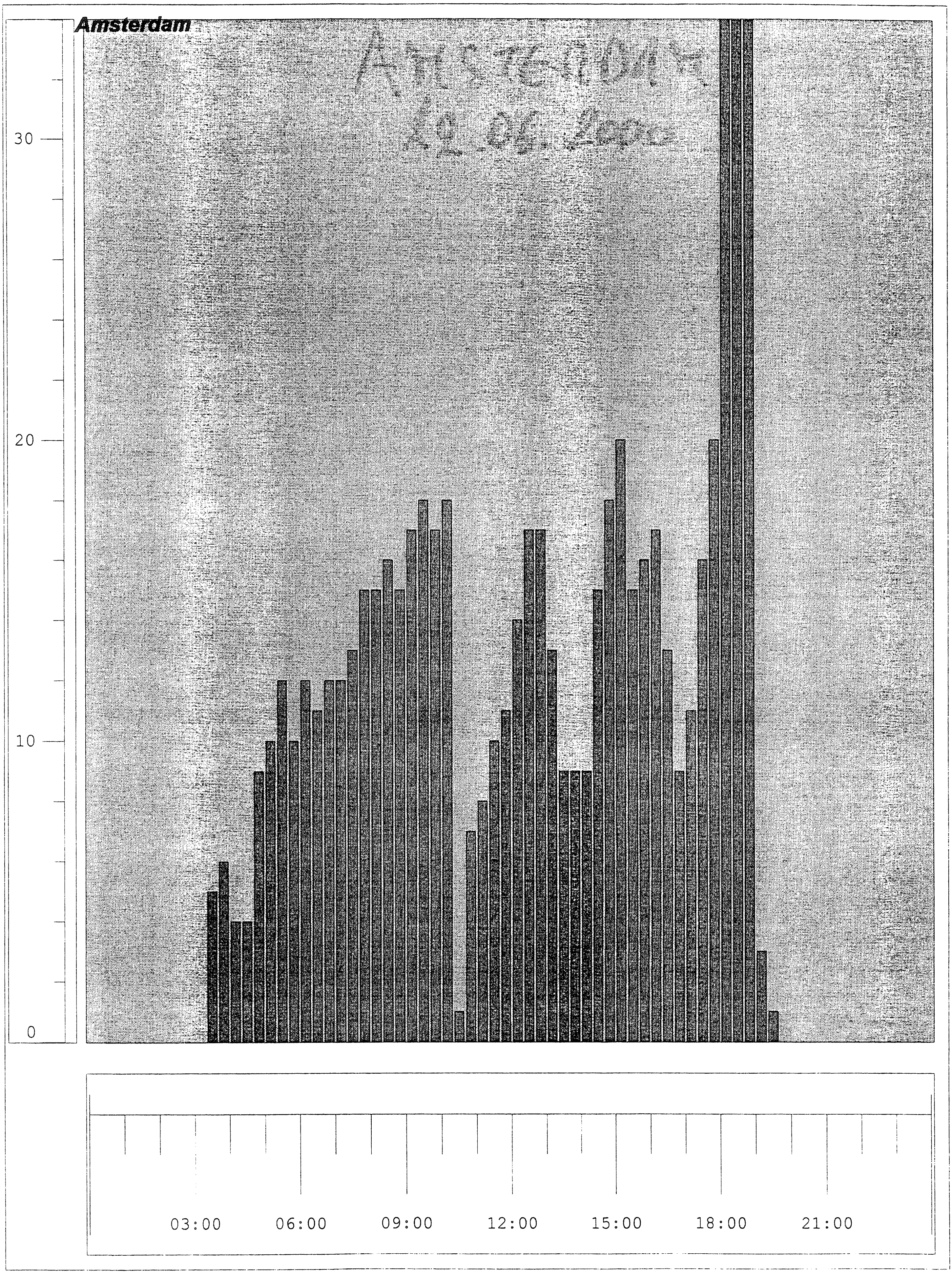
AD LSZH D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



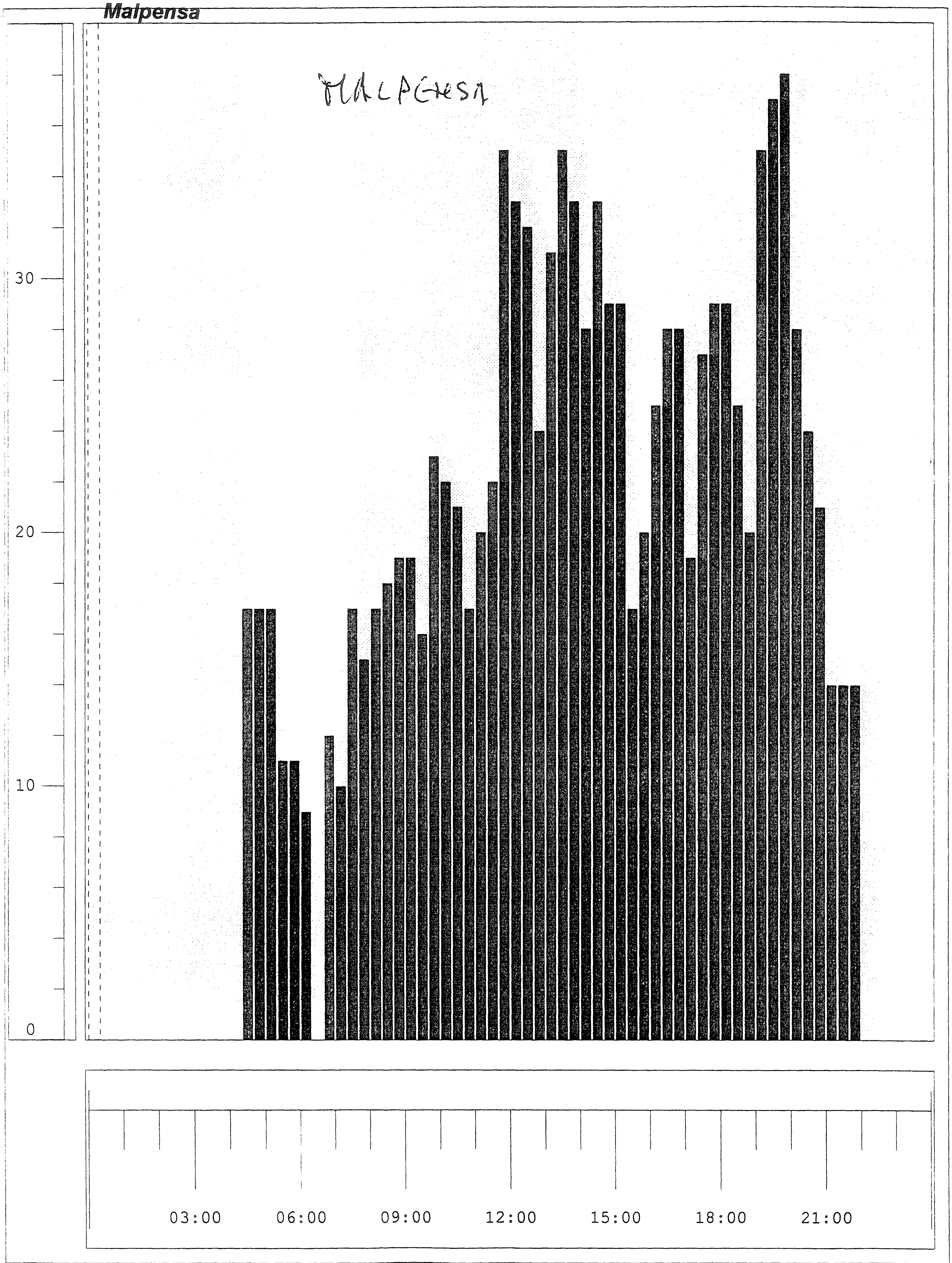
AD EBBR D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



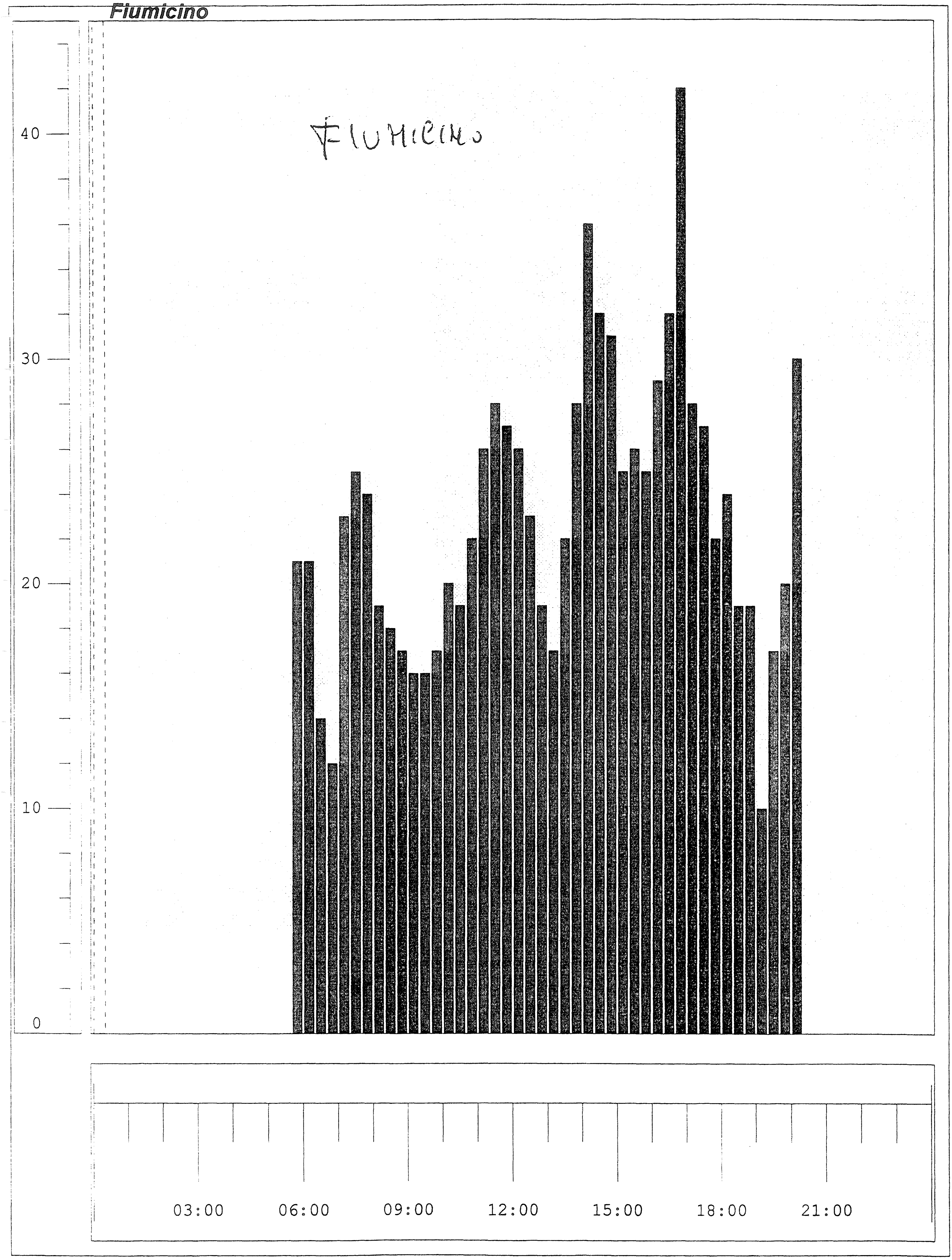
AD EHAM D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Thu 22 Jun 2000



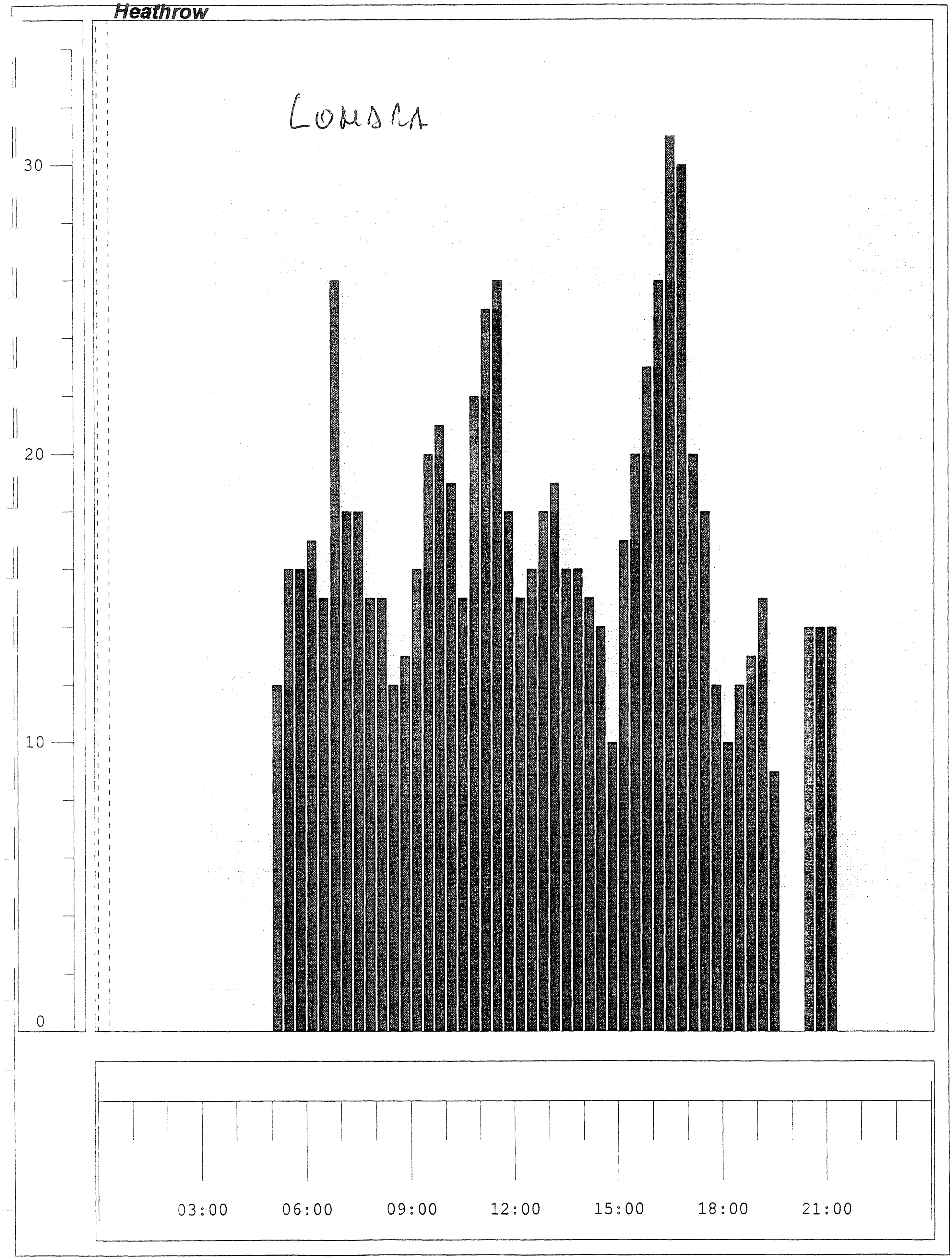
AD LIMC D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



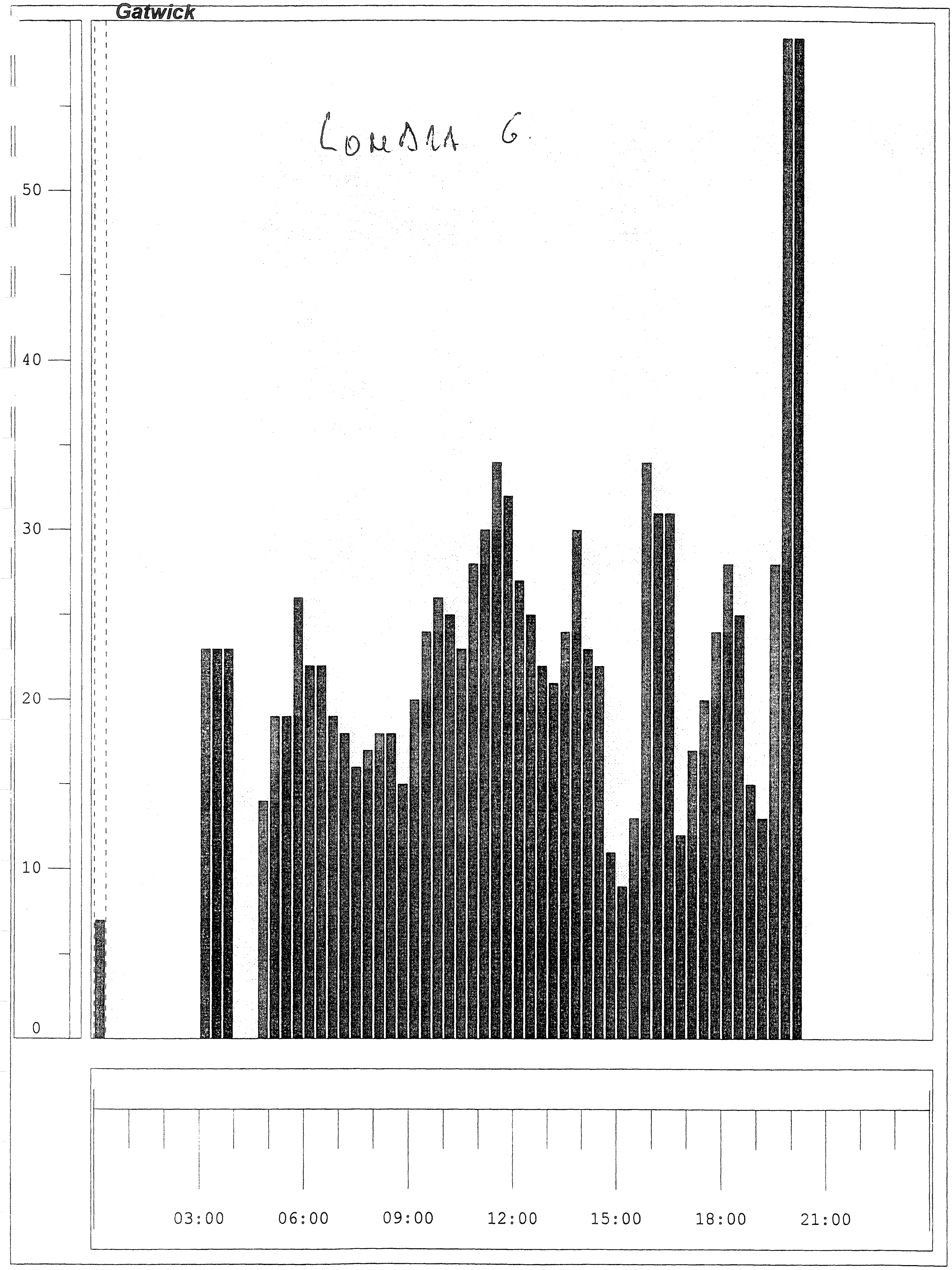
AD LIRF D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



AD EGLL D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



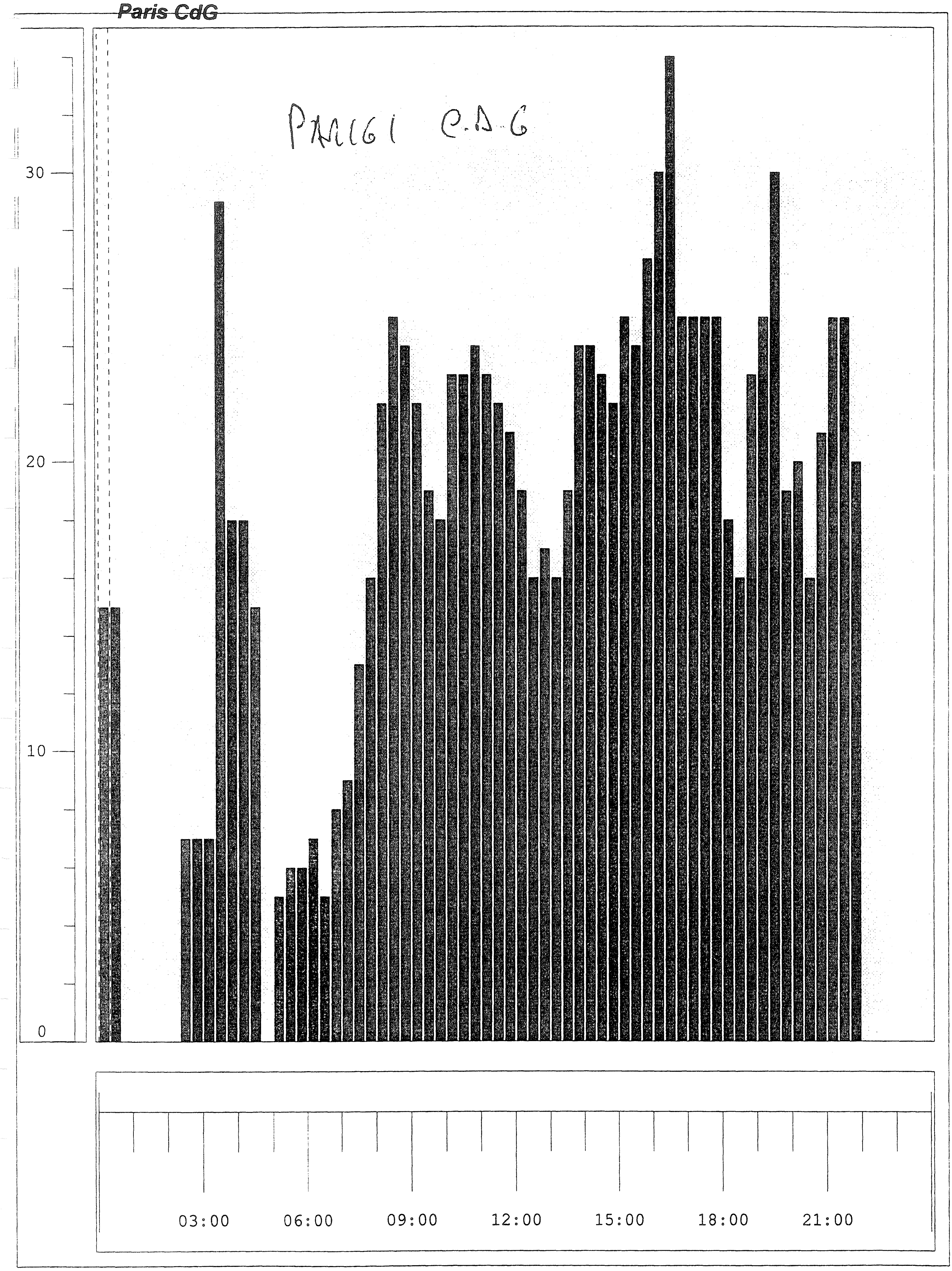
AD EGKK D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



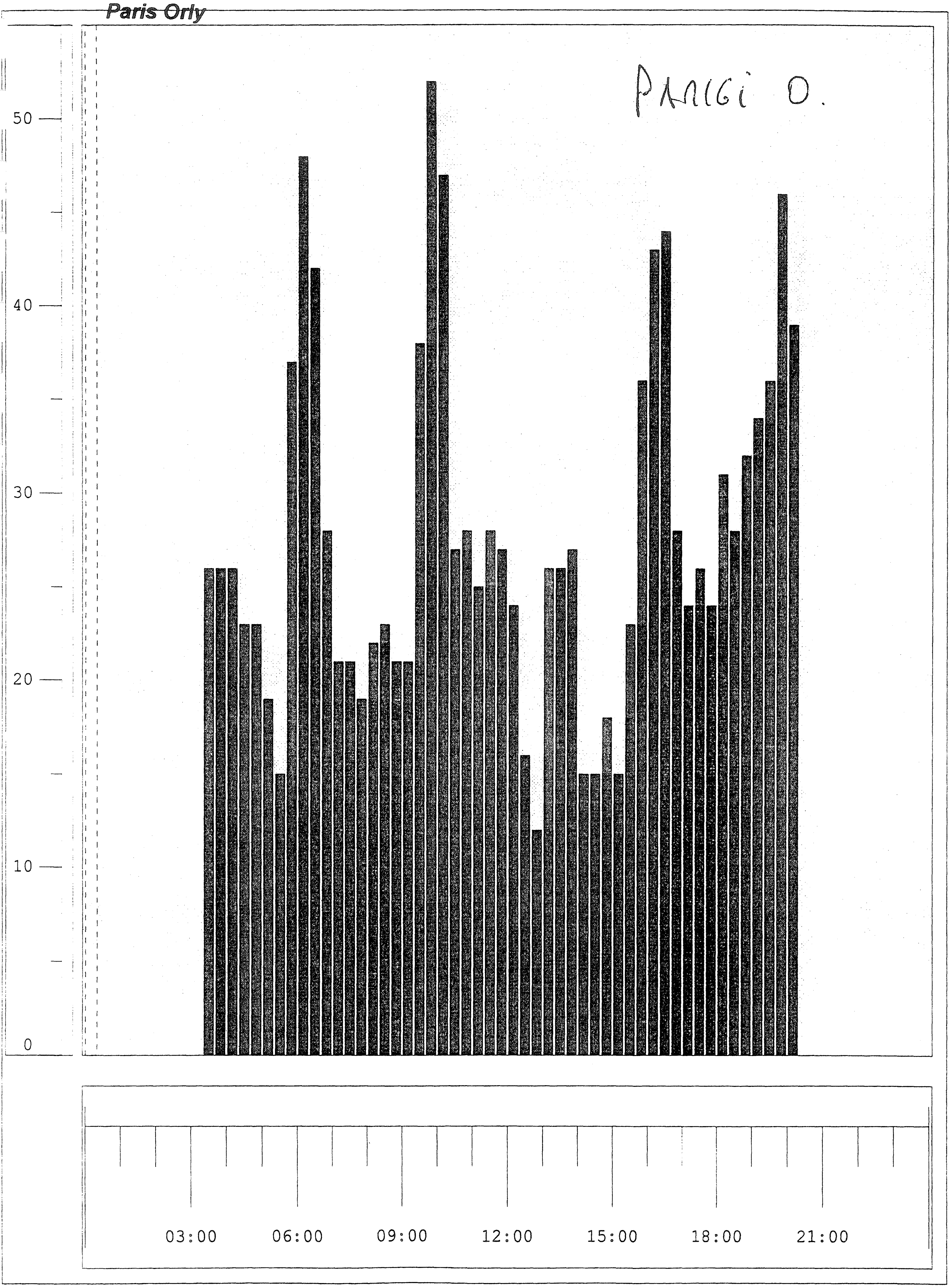
TACT Access

25-19:29 Updated

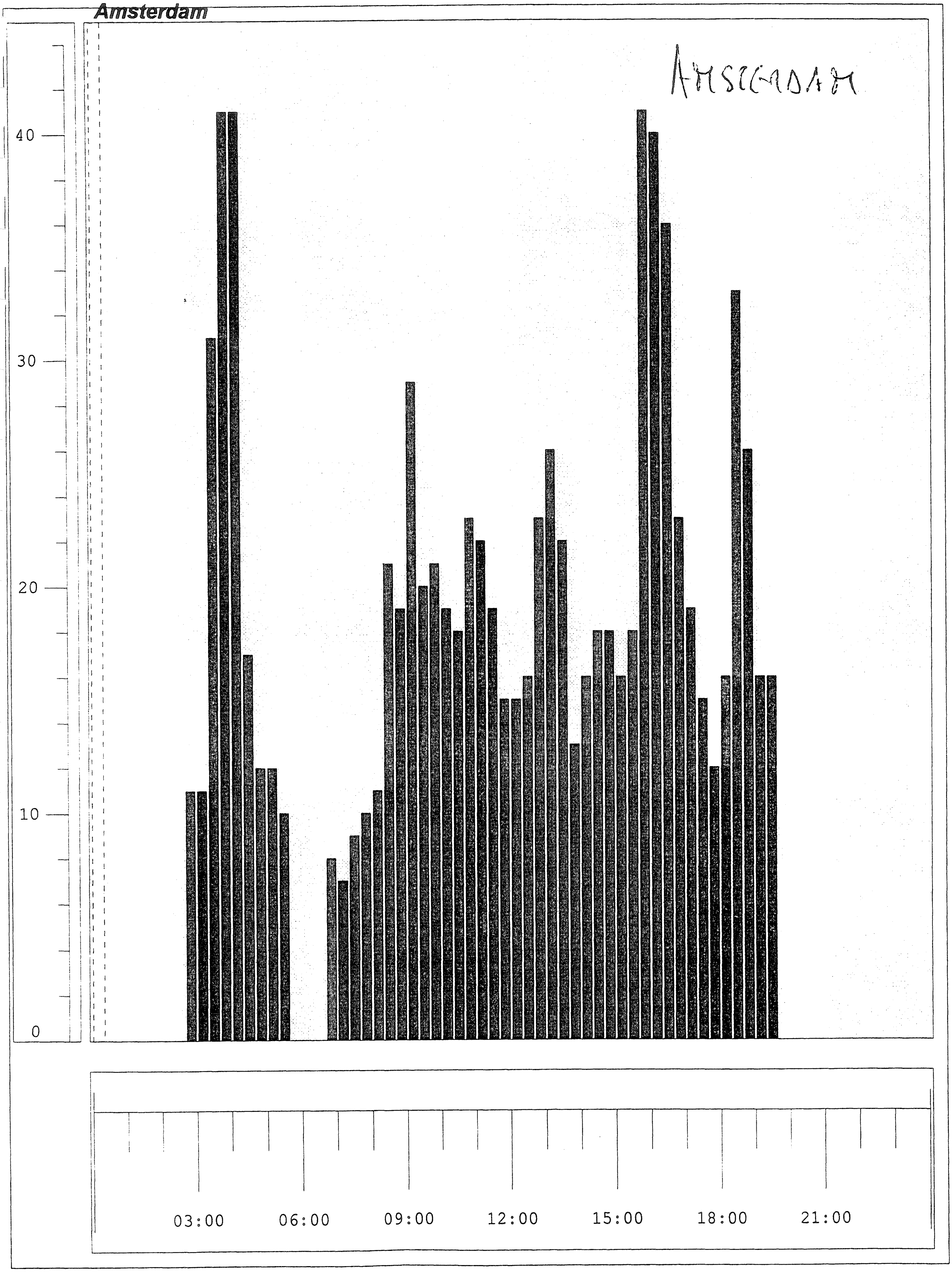
AD LFPG D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



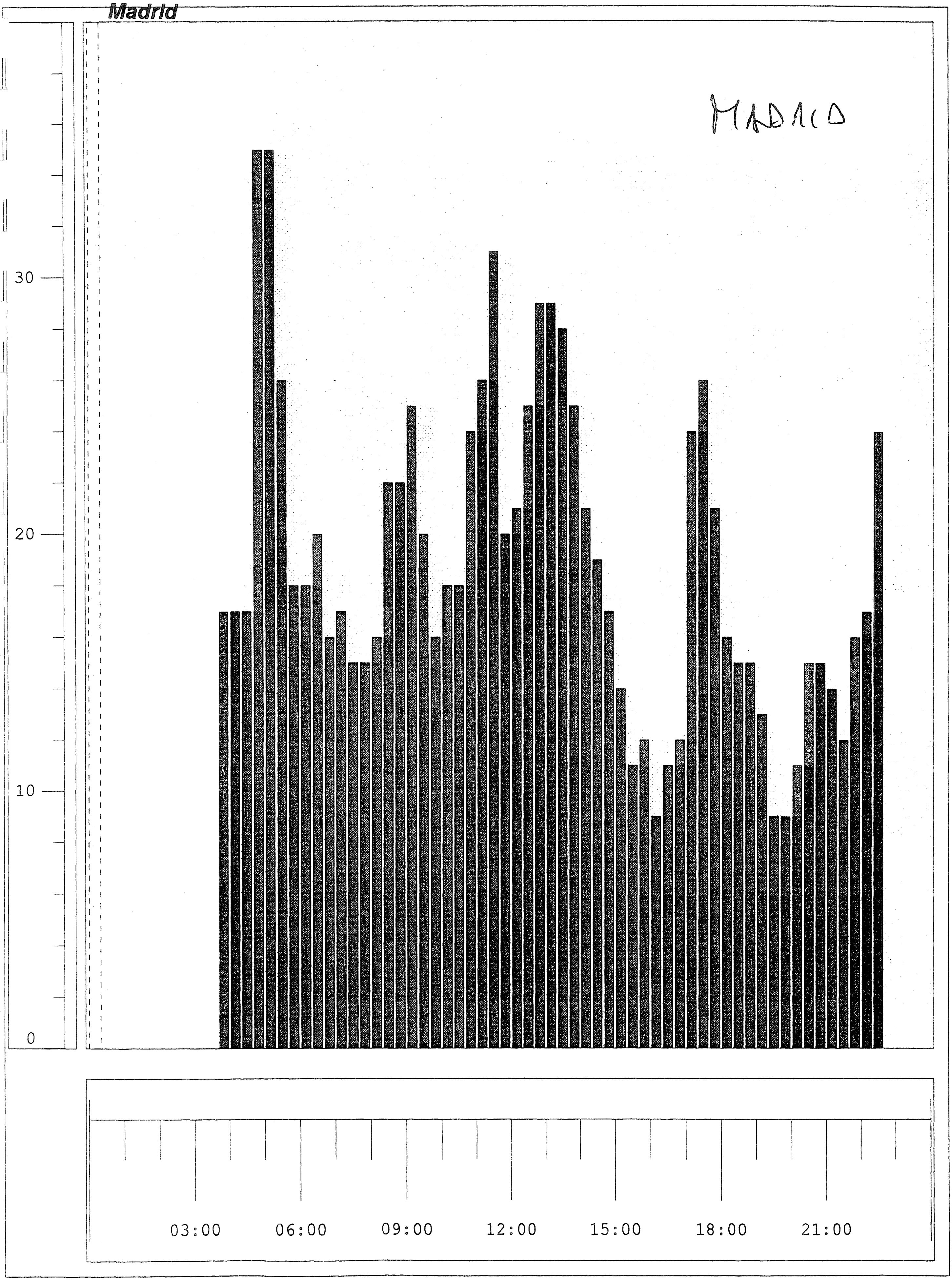
AD LFPO D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



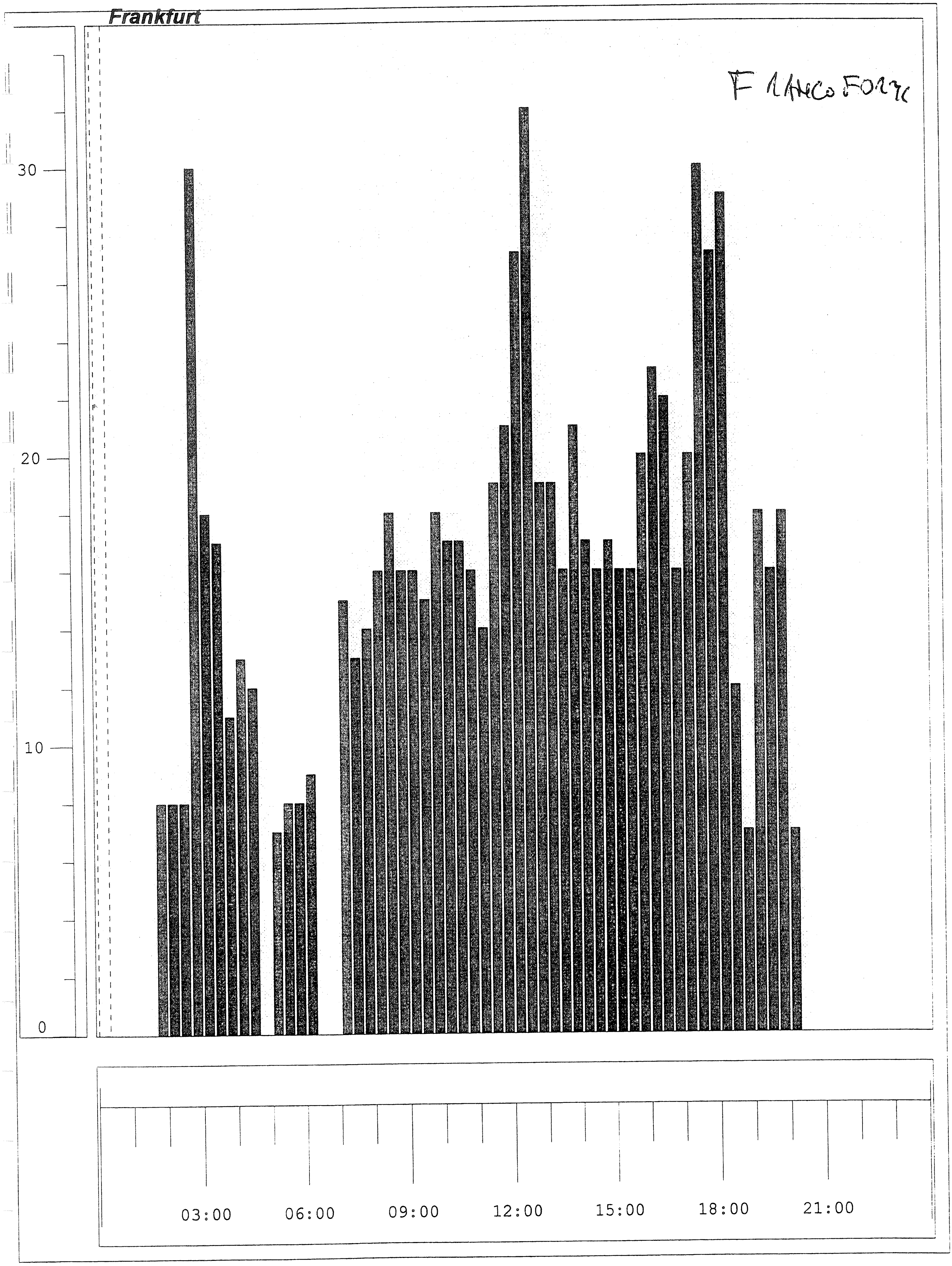
AD EHAM D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



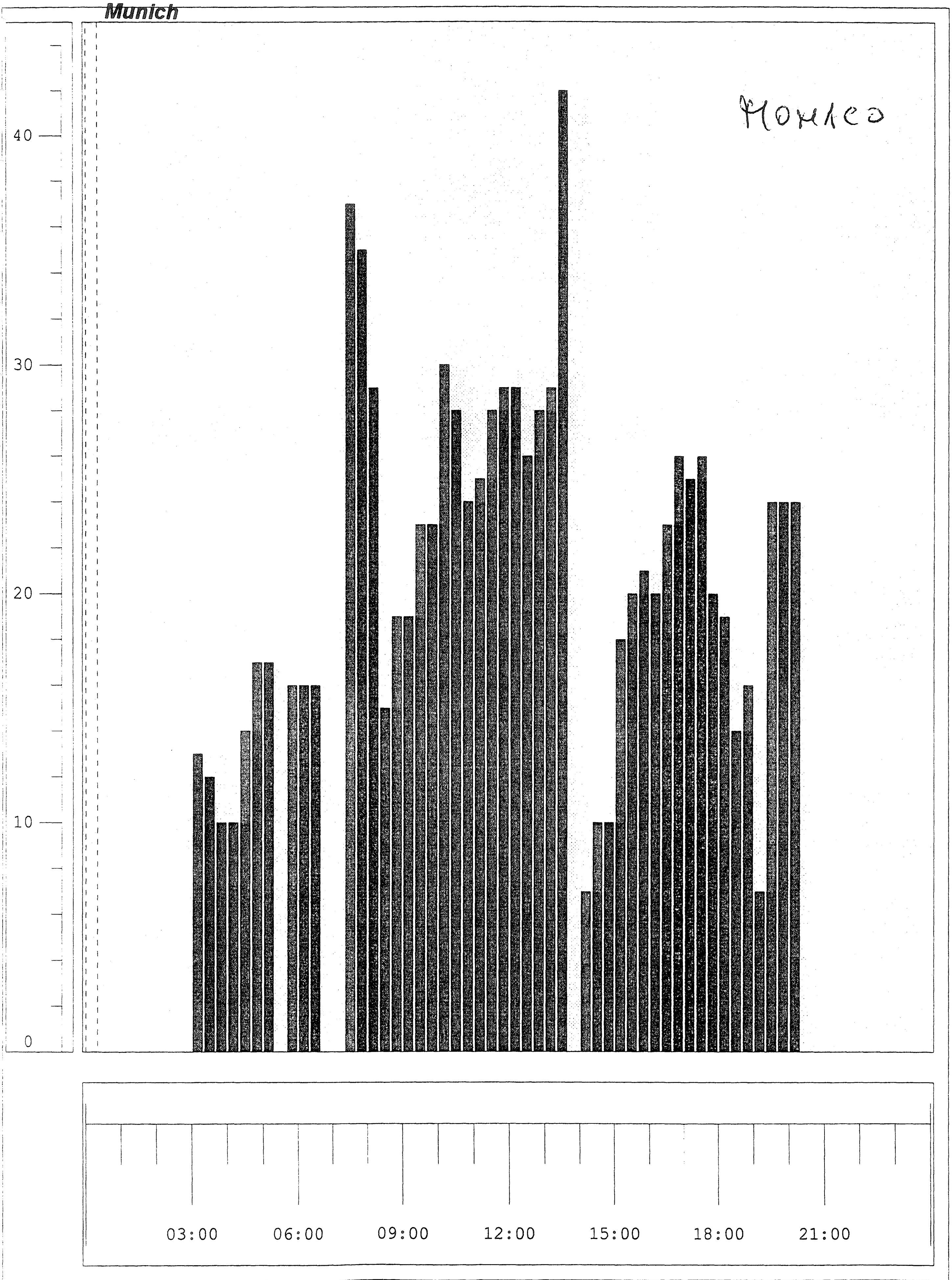
AD LEMD D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



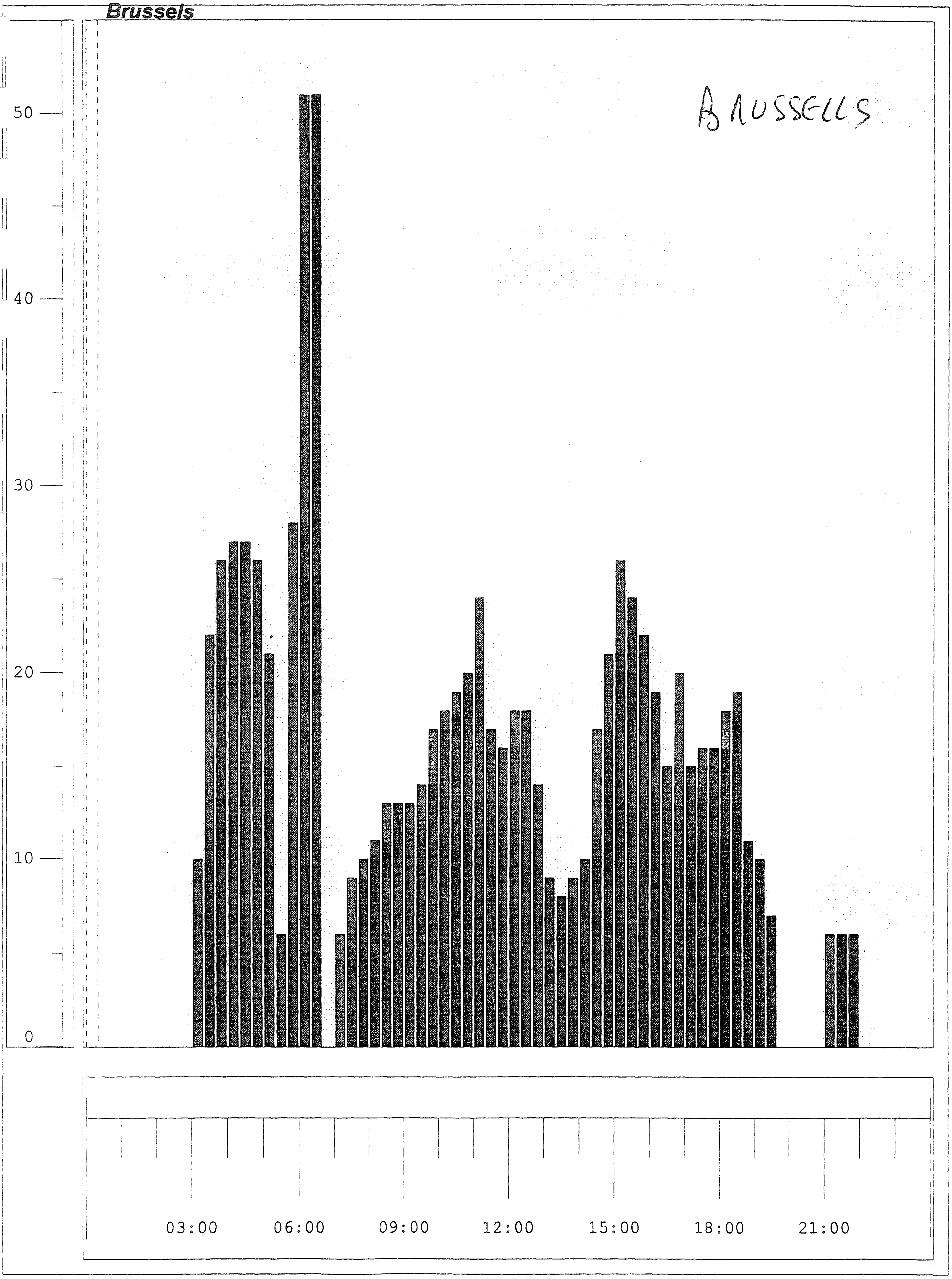
AD EDDF D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



AD EDDM D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



AD EBBR D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000



AD LSZH D Delays
Delayed Traffic average delay
Observed period: 00:00 - 24:00, Sun 25 Jun 2000