Report No. DOT/FAA/AT-90-002

REFERENCE

MTR-90W00111

FAA WJH Technical Center
00093412

TRAFFIC MANAGEMENT COORDINATOR USER'S GUIDE FOR ESP/ASP

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SEPTEMBER 1990

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

OFFICE OF AIR TRAFFIC PLANS AND REQUIREMENTS SERVICE
Washington, D.C. 20591

ABSTRACT

This document is oriented to the role of the Traffic Management Coordinator (TMC) and the use of the En Route Spacing Program (ESP)/Arrival Sequencing Program (ASP) automation contained in the NAS A4e0.3 software release. The information is provided as a supplement to the National Airspace System Configuration Management Documentation (NAS-MD). This user's guide is intended to familiarize TMCs with the application of the ESP/ASP automation aids including the functional aspects. The document supports both the daily use of ESP/ASP at an Air Route Traffic Control Center (ARTCC) and use for reference and instructional purposes. Included are detailed descriptions of the ESP/ASP input messages and annotated examples of Plan View Display (PVD) outputs. Additionally, some of the operational task considerations for the TMC are highlighted as well.

Suggested Key Words: Traffic Management Coordinator (TMC), En Route Spacing Program (ESP), Arrival Sequencing Program (ASP), En Route Metering.

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SECTION 1

INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this user's guide is to provide the Traffic Management Coordinator (TMC) with a reference where information can be found to support both training and the daily operation of metering at Air Route Traffic Control Centers (ARTCCs). The background material necessary to effectively use the metering automation is covered as well. The main features of the En Route Spacing Program (ESP) and the Arrival Sequencing Program (ASP) Package-1 automation are presented. This guide is intended to also provide insight to the TMC as to the reasoning behind each ESP/ASP feature. With this knowledge the TMC can best judge when and how to use a given feature. The NAS-MD series should serve as the final source for information pertinent to ESP/ASP specifications.

1.2 GENERAL OVERVIEW OF METERING

The following material introduces some metering parameters that are required to be adapted in the ASP and ESP meter records of the Adaptation Controlled Environment System (ACES) of each Center. For a complete coverage of the necessary metering adaptation, see NAS-MD-326[1] and the *Adaptation Development Guide for ESP/ASP*.[2]

The NAS metering function will provide the TMC with sequenced lists of aircraft destined to adapted ASP internal airports and ESP external airports. Figure 1-1 is an overall high-level diagram for the application of the NAS metering function. The objective of the NAS metering function is to aid the TMC by automating the sequencing of aircraft using an acceptance rate which represents the capacity of an airport. These automation aids consist of tabular meter lists displayed at the TMC PVD. For ASP only, tabular sector lists can be displayed, at a TMC option, on selected sector controllers' PVDs. Optionally, metering data can also be routed to the Traffic Management Workstation Computer to provide TMC metering lists on alternative TMC display devices (if available).

These lists provide metering information and a program-calculated sequence for aircraft destined to a specified airport or fix. Metering information for each aircraft in the list includes the predicted time of arrival at the airport or fix (vertex), the metering assigned time of arrival based upon the vertex capacity, and the amount of delay, if any, each flight must absorb to meet the metering assigned time.

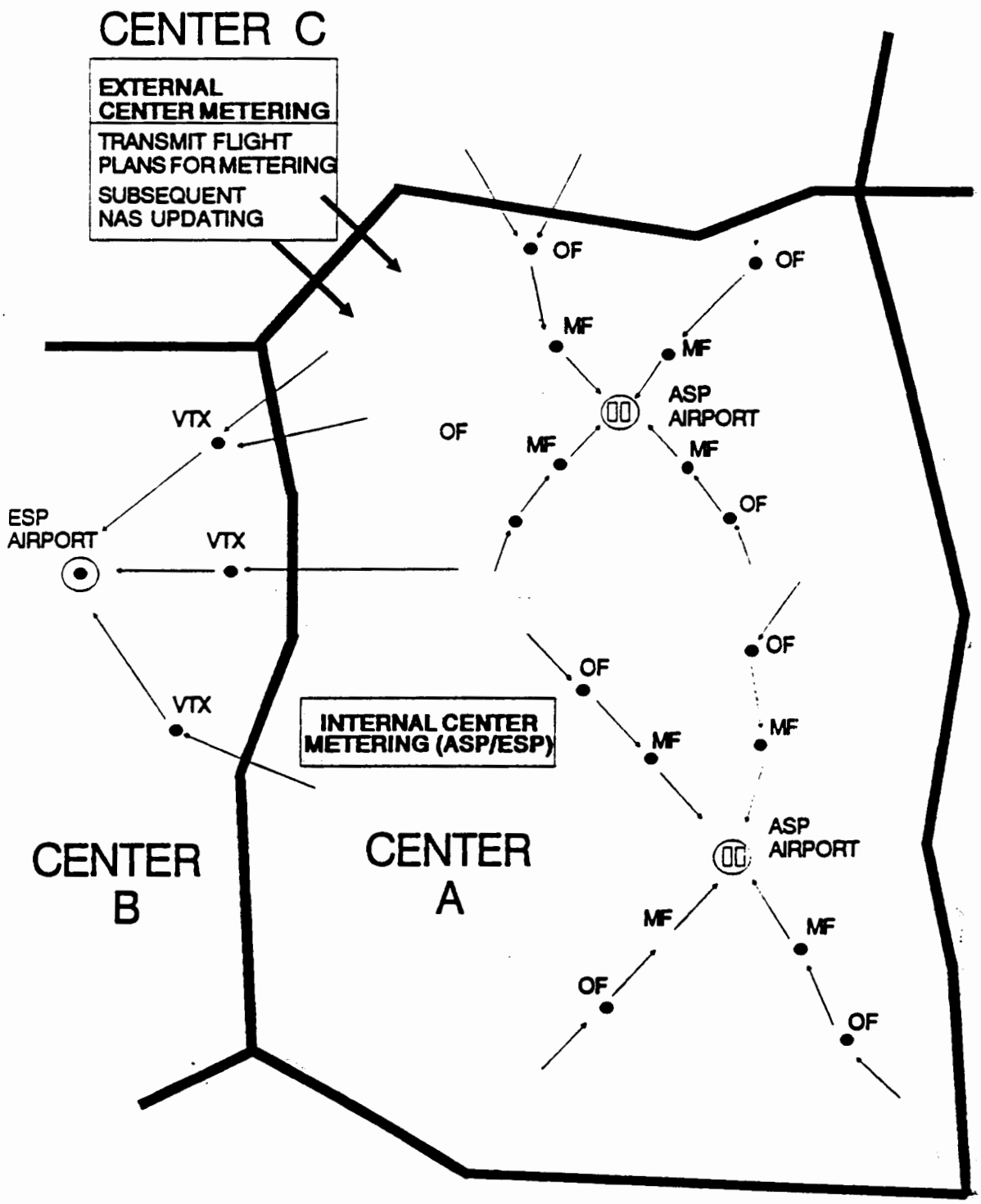

Figure 1-1. Global View of ASP and ESP Applications and Internal and External Center Metering

Referring to figure 1-1, the ASP metering function is an enhancement to the capabilities of the ERM-1A function. The ASP function sequences aircraft inbound to airports within the local center using adapted approach paths, which include speed reduction segments and special fixes designated as meter fixes.

The ESP function extends the capabilities of the ASP metering function to include flights destined to airports external to the metering center. The ESP metering function provides the TMC with an automated tool to sequence aircraft destined to adjacent centers while satisfying the Miles-In-Trail (MIT) restrictions. The TMC receives a global survey of all traffic subject to spacing restrictions so that a center-wide plan can be formulated to meet these restrictions.

Shown in figure 1-1 are the two separate metering functions, Internal Center Metering and External Center Metering, which are available to the TMC. The Internal Center Metering function refers to the process of metering aircraft destined to other NAS centers (ESP application) and aircraft destined to internally located airports (ASP application). The External Center Metering function is a support process which assists Internal Center Metering by identifying flights destined to adapted metering airports in the adjacent center and transmits these flight plans to the adjacent center so that Internal Center Metering benefits from receiving flight plan information earlier. Once metering flight plans have been successfully transmitted, the External Center Metering function also determines when subsequent NAS time updates should be transmitted.

1.3 BACKGROUND

The ESP/ASP automation is an extension of the En Route Metering (ERM) program, known as ERM-1A, used at some en route Centers. The ERM-1A software was primarily developed by FAA staff at Denver and Dallas/Fort Worth Centers and has proven to be an effective tool for metering air traffic to a particular airport located internal to the Center performing metering. Some ERM-1A limitations have, in the past, prevented use of metering automation at several centers. The ESP/ASP automation was developed to address many of the known ERM-1A limitations and to provide automation for the additional ESP application. In general, ESP/ASP Package 1 adds to ERM-1A the following functional capabilities:

- ESP capability to display a metering position list on the TMC's Plan View Display (PVD).

- ASP/ESP sequencing features such as priority techniques, manual assignments, automatic and manual swap slot capability, and down-arrow processing.

- Multiple vertex capabilities to account for independent sequencing at multiple ASP runways or ESP vertices.

- Metering Position List display format changes to support multiple vertex capabilities, display of total delay assigned to each flight, and indication of heavy jets.

- Improved metering times via direct use of tracking data and time updates for free-track flights within the selected tracking region.

- Earlier transmission of flight plan data from the upstream center to the local center performing metering and more frequent and refined NAS time updates for metered flights from the upstream-adjacent center.

- Transmission of metering data to Traffic Management Workstation (TMW) Computer, for display on available Meter List Display (MLD) devices. Note that in order to make use of the feature, there must be appropriate software and hardware (e.g., display devices) on the TMW side.

- Metering Vertex Time of Arrival (VTA) updates for frozen flights as delays are absorbed by each flight. This delay will count down at both the TMC metering position list and the radar sector metering lists.

- A change to eligibility of ASP meter fixes so tower en route flights may be assigned to a meter fix with associated metering processing.

1.3.1 Background Material - General Similarities Between ASP and ESP Automation

Although there are two metering applications, ASP and ESP, many of the features and concepts are the same between programs. Both ASP and ESP sequence airplanes to a vertex. For ASP, the vertex is typically the runway threshold. For ESP, the vertex is the coordination fix, usually located just outside the boundary of the center performing ESP metering. In both applications, the TMC is required to enter a vertex capacity called the Vertex Acceptance Rate (VAR). The VAR value is the number of airplanes per hour that can be sequenced to the particular runway/vertex for ASP or over a specific coordination fix/vertex for ESP.

Both ASP and ESP programs provide a specific list, on the TMC PVD, of sequenced flights, each with a predicted undelayed VTA and the metering assigned time to the respective vertex. This metering assigned time is based on the entered VAR capacity and can be either a non-frozen (tentative) or frozen time in ASP and ESP. The ASP program has assigned metering times called the Tentative Calculated Landing Time (TCLT) and the Actual Calculated Landing Time (ACLT) for frozen flights. The ESP program

has assigned metering times called the Tentative Calculated Vertex Time (TCVT) or the Actual Calculated Vertex Time (ACVT) for frozen flights.

The criteria for determining when aircraft assigned times go from tentative to frozen is similar for ASP and ESP. The only difference is the reference. For example, in ASP, aircraft assigned times go frozen (e.g., become ACLTs) when the undelayed time of arrival at the meter fix is within FCLT (a metering parameter) minutes flying time from the respective meter fix. In ESP, the same parameter FCLT is used; however, the ESP reference is the respective ESP vertex. Many other parameters are common to ASP and ESP with the only difference being the reference to which the particular parameter is applied. Enough said for now, next let's discuss some of the specifics of ASP and ESP.

1.3.2 Background Material - The ASP Application

Illustrated in figure 1-2 is a generic airport configuration that would be adapted in the ASP meter record of ACES for a given center. This example introduces some basic metering terminology. Since ASP automation references metered airplanes to the runway threshold (or vertex), ASP has airport related data fields, such as metering adapted meter fixes and outer fixes. Additionally, the nominal approach paths need to be adapted for the different ASP airport configurations. These are called approach speed segments and they allow the ASP metering program to calculate the undelayed predicted VTA of each flight. The program will automatically sequence the airplanes to a particular vertex based upon the specific route converted meter fix from the filed flight plan of each aircraft. Once the ASP automation has calculated the predicted VTA of metered flights, each is sequenced and assigned a TCLT or ACLT based on the TMC entered VAR capacity.

Now that the assignment of metering vertex times (TCLT or ACLT) has been completed, the next step is to refer these times back to where the center personnel have control of the airplanes. To do this, ASP automation will compute and display the Meter Fix Name (MFN) and the assigned Meter Fix Time (MFT). Additionally, the Outer Fix Name (OFN) (if any) and assigned Outer Fix Time (OFT) are computed and displayed. All these metering times are displayed at an adapted metering position PVD when a particular airport list is requested by a TMC. The MFT and OFT are the assigned time that, if met, will accomplish the metering task of matching the airport capacity to the demand (airplanes) on a particular airport.

If the demand on an airport exceeds the capacity, then some delays must be absorbed by the metered flights. The difference between the assigned TCLT or ACLT and the undelayed predicted VTA is the total amount of delay that

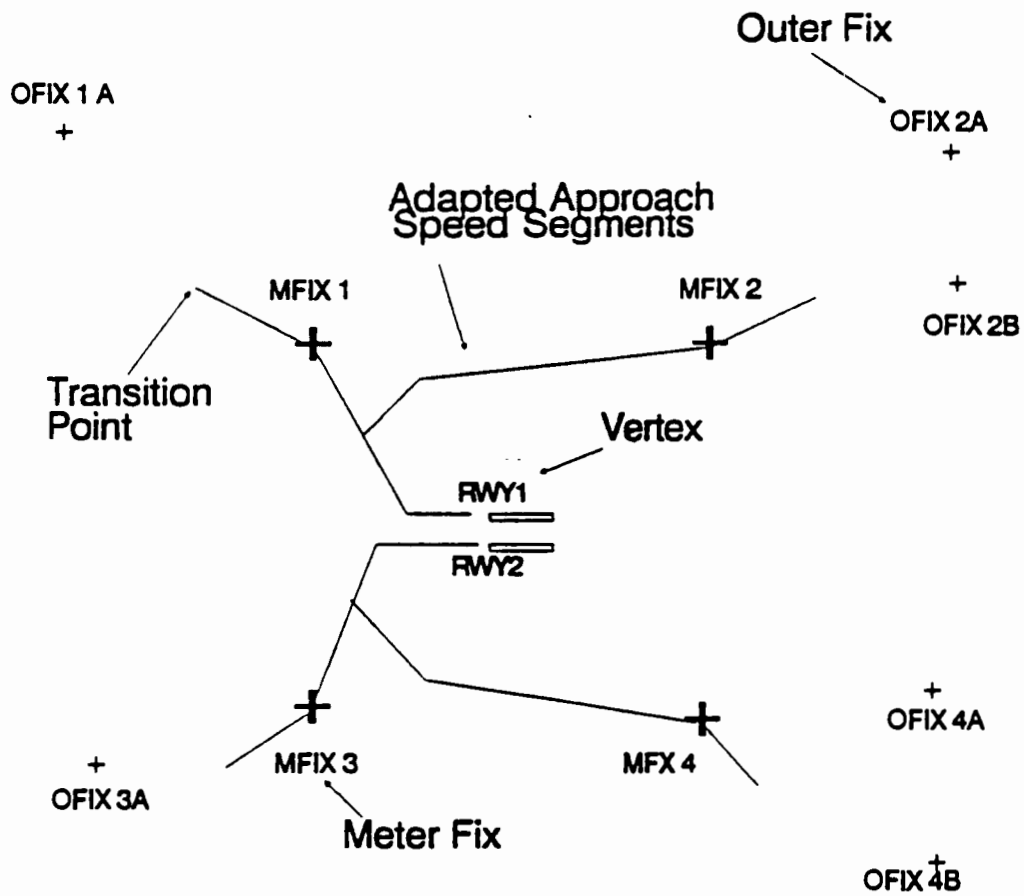

Figure 1-2. Generic Example of an ASP Multiple Vertex Airport Configuration

a given airplane must absorb. Generally, the ASP metering program assigns all of the delay to the airplanes while each is in center airspace. Thus, the total delay is also reflected in the assigned MFT. If the airplanes have an adapted outer fix in their filed flight plans, an OFT will be assigned as well. A specific adapted parameter called AMDT sets the maximum amount of delay to be absorbed between the meter fix and outer fix. The assigned OFT of a given flight is based upon the total delay assigned and the AMDT parameter. As a result, only delays greater than AMDT will be reflected in the assigned OFT. For the special case of manual assignments, a speed-up situation may occur where negative delay values will be displayed to represent this situation. For ASP, the TMC may turn on sector list displays for the arrival sector which contains the meter fix and the outer fix sectors. This is discussed more in section 2.

In the example of figure 1-2, the only difference between ERM-1A and ASP introduced so far is the ability to represent multiple runways (up to four vertices) with separate approach paths. This and other ASP and ESP capabilities are covered in more detail in the Functional Summary of section 3. Additionally, several metering parameters and some adaptation requirements have already been discussed here. Section 5 will discuss, in detail, the specific input messages which allow the TMC to operate metering in a real-time environment. For a complete coverage of the required meter record to be adapted in the ACES at each center, see references 1 and 2.

1.3.3 Background Material - The ESP Application

The ESP automation will provide the TMC with a list of metered aircraft, with their associated metering times and related data, that are destined to externally located airports. An example of a typical ESP application is shown in figure 1-3. There are three important ESP metering terms illustrated.

- ESP Airport - The external airport where all or some flights destined to have ESP restrictions placed upon them. These restrictions have historically been MIT spacing restrictions.

- ESP Vertex - The fix at which flights are sequenced over by the Center performing ESP (in this case, ZAB). The MIT restrictions are referenced over this vertex. The ESP vertex must be external to the ESP center and within the eligibility wedge as discussed next. Only one vertex per wedge is allowed.

- ESP Adapted Eligibility Wedge - This is an adapted wedge originating at the ESP airport and extending to the center boundary of the ESP metering center. The wedges are defined in adaptation by the angles of the two rays extending from the center boundary to the ESP airport. Up to four eligibility wedges and associated vertices may be adapted for one airport.

In the ESP automation, the TMC will enter a VAR capacity value (planes per hour) for the ESP vertex. This VAR value is related to the current MIT restrictions. By managing air traffic such that the entered VAR capacity value is met at the ESP vertex, the currently used MIT spacing requirements for ESP can be satisfied. The figure 1-4 illustrates how the TMC entered VAR can generally be related to the MIT restrictions for a specific aircraft type.

The ESP automation will organize the designated ESP flights in a metering list. This will better allow the TMC to monitor each flight's progress through the center performing ESP. The metering program will calculate the undelayed VTAs. Using these undelayed VTAs to build a sequence over the vertex, the program will assign a TCVT or ACVT to each flight. The assigned times reflect the VAR capacity value entered by the TMC.

In the first field delivery of ESP automation, the TMC has no option to display these metering assigned vertex times to the controlling sector. A later upgrade is planned to provide this TMC option of routing ESP sector lists.

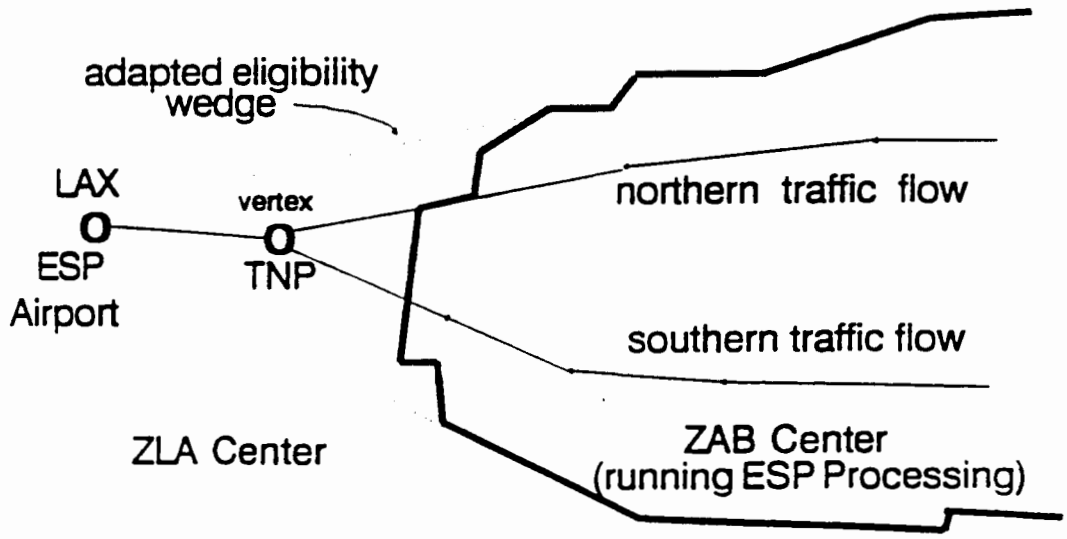

Figure 1-3. A Typical ESP Application

ARRIVAL RATES

Selected by TMC, Entered by AD messsage

For a 480 knot aircraft :

MIT	RATE
8	60
10	48
15	32
20	24
30	16

Figure 1-4. How to Generally Relate VAR to MIT

SECTION 2

GETTING STARTED

As a TMC with operational knowledge of the air traffic flows in your center, you may be involved in identifying the appropriate ASP and ESP adaptations to your ACES support personnel. Although many metering parameters can be changed on-line via the Change Parameter (CP) message, the meter record parameter settings determine what is used initially when metering is turned on. In operations, the TMC will have the major responsibility for the management of the metering programs. Therefore, the TMC personnel should have significant input as to the requirements for the ACES meter records.

Assuming that you are now somewhat familiar with the ASP and ESP applications in your center, this section is a quick introduction to the use of metering automation. As a TMC in charge of the metering position PVD, there are several input messages that can be input at your PVD in the Arrival Display (AD) message format. Additionally, as stated above, there are the CP messages that are entered at the Keyboard Video Display Terminal (KVDT). Metering has several of these AD and CP messages. This section introduces some of the most commonly used input messages. For a complete reference to each input message, format options, its usage and special considerations, see section 5.

The AD messages related to a specific metered airport can be entered only at an adapted metering position PVD or the associated D-position. When AD messages are entered at the R-position metering PVD, the PVD Quick-Action Key (QAK) should be selected prior to entering the AD message. Optionally, AD messages may be entered at the associated D-position. In this case, the letters **QP** should be entered instead of the PVD QAK. The entered AD message will be displayed on the Computer Readout Display (CRD). Upon acceptance of the AD message, the message **Accept PVD** will be returned on the CRD. See figure 2-1.

2.1 TURNING METERING ON

To start, metering has to be turned on at the KVDT in order to use ASP and ESP automation. One CP message turns metering on, as follows:

CP METR ON
KVDT message returned - Accept CP

Now that metering has been turned on, let's look at a few TMC options in a little more detail.

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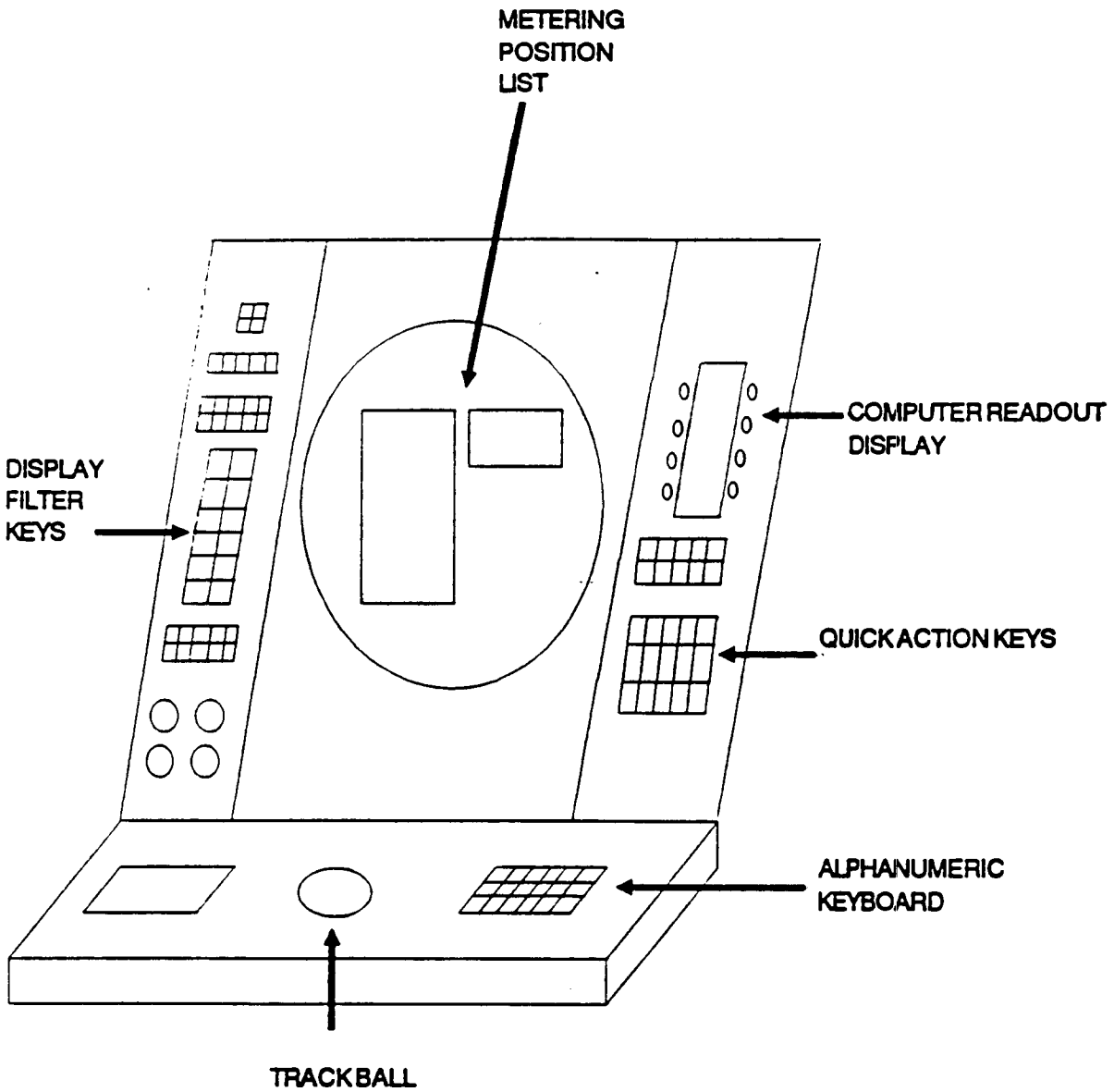


Figure 2-1. Metering Position PVD

2.2 DISPLAYING METERING POSITION LISTS

Moving to the specially adapted metering position PVD, the following message can be entered to display a metering position list for a designated airport.

Q/A Key	Message Format
PVD (QP)	AD mapt ON

where mapt refers to the three-character ASP or ESP airport ID.

After displaying a metering list for the designated airport, the metering list can be immediately suppressed by selecting the Inbound Display Filter key. Pressing the inbound key again will redisplay the previously entered list.

The currently displayed metering list can be turned off by entering the following message:

Q/A Key	Message Format
PVD (QP)	AD (mapt) OFF

Note that the mapt field is optional and is implied to be the currently displayed list. It is possible for a TMC to suppress the metering position list currently displayed at another metering position PVD.

2.2.1 Introduction to Format of ASP Metering Position List

The general format of a typical ASP metering position list is shown in figure 2-2. The airport header relates information about the current and future status of a given airport configuration(s), the applicable VARs, any vertex delays and the identifiers of any combined peripheral airports. The specifics of metering lists are covered in more detail in section 6.

Typically, the metering position list may be divided into non-frozen and frozen groups. The non-frozen portion of the list is for those flight entries which have not yet reached the freeze region of metering. These flights are assigned TCLTs at their designated vertices. Note that the non-frozen flight entries are further subgrouped according to their associated vertex and meter fix. Aircraft are grouped in each sublist with the earliest assigned TCLT at the bottom of each list.

Upon reaching the freeze region of metering (as determined by the Freeze Calculated Landing Time (FCLT) or Meter List Display Interval (MLDI) parameters) the non-frozen flight's assigned TCLT becomes a frozen ACLT with the flight entry moving to the freeze portion of the metering list. The

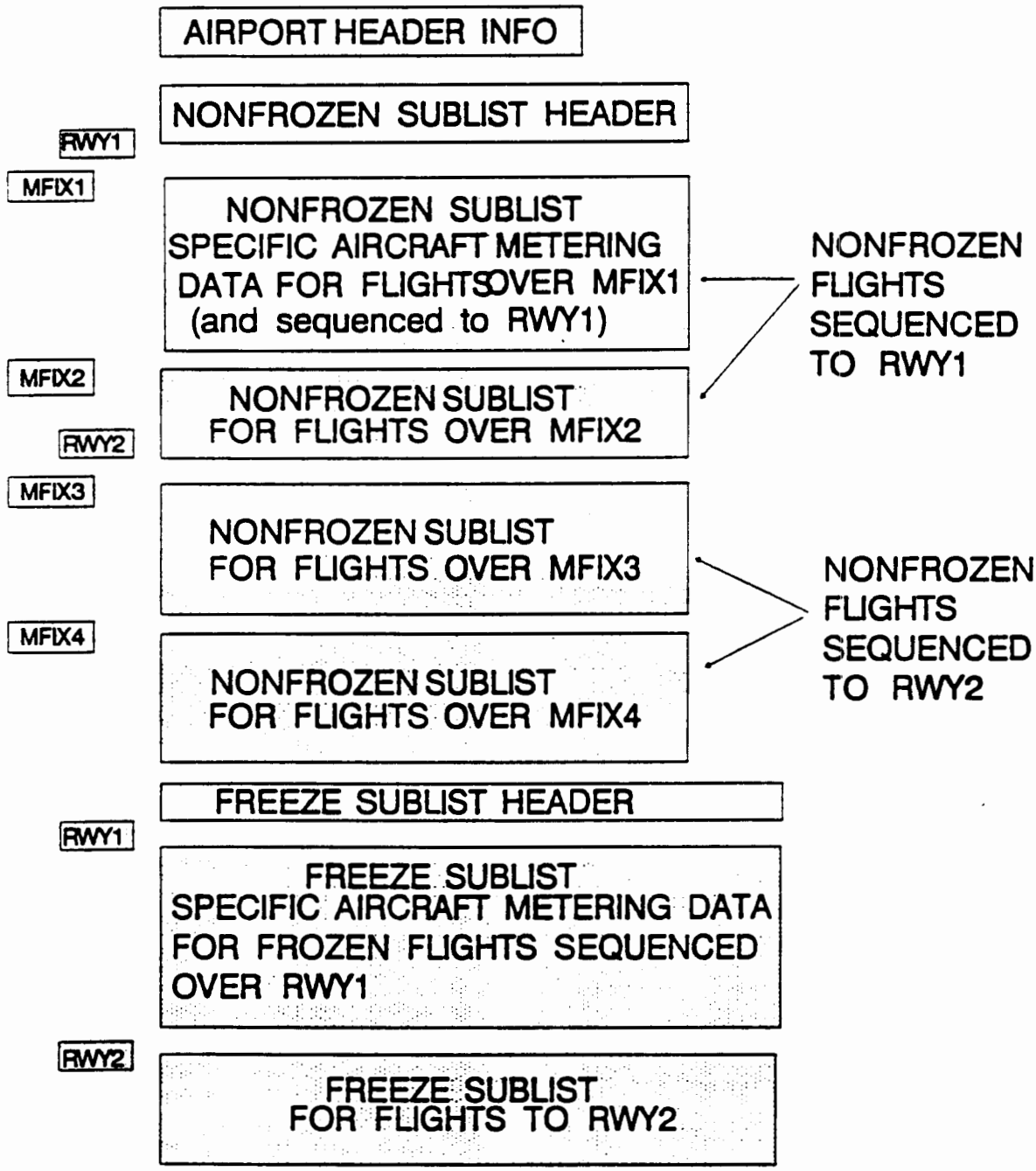


Figure 2-2. Illustration of ASP Metering Position List Format

frozen flights are subject to less dynamic sequencing rules than the non-frozen flights. In a general sense, this means that a frozen flight's assigned time will not change as updates occur to its VTA. Resequencing and changes of frozen flight assigned times may occur when changes to the airport condition are entered.

2.2.2 Introduction to Format of ESP Metering Position List

The format of the ESP metering position list is similar to the ASP format and is shown in figure 2-3. Like in ASP, the ESP metering list has a similar airport header. Similarly, the ESP metering position list has non-frozen and frozen portions. The non-frozen flights are assigned TCVTs and grouped according to their designated vertex.

Upon reaching the freeze region of metering (as determined by FCLT) the non-frozen flight's assigned TCVT goes frozen and becomes an ACVT. This event causes the flight to move to the frozen portion of the metering list. Flights are listed with the earliest assigned time at the bottom of each sublist. See section 6 for more specifics on the ESP metering lists.

2.3 A FEW WORDS ON AIRPORT CONFIGURATIONS

As discussed in the Background Material and shown in figures 1-2 and 1-3, specific ASP and ESP airport configurations must be adapted in the ACES meter records. Each ASP and ESP airport can have up to 50 adapted configurations.

For ASP, there should be enough airport configurations adapted to adequately represent the various terminal approaches. This is because ASP metering projects each flight, through the nominal approach path, to a vertex. The projected VTA of each flight is a metering estimate based upon the NAS Calculated Time of Arrival (CTA) at the meter fix and the adapted approach path using the speed segments. The more accurately airport configurations represent the various terminal situations, the more accurate will be the metering predicted time. A major TMC responsibility is to try to match the current and planned airport configuration to an adapted airport configuration in metering.

For ESP it is anticipated that there will be less of a need to frequently change airport configurations. In ESP, airport configurations really define airspace (wedges) which determine eligibility for sequencing of flights to a designated fix (vertex) within the wedge. These airport configurations may need to be changed for conditions such as bad weather around a given vertex. In this case, it is desirable to have alternative ESP airport configurations adapted to allow sequencing to another designated ESP vertex.

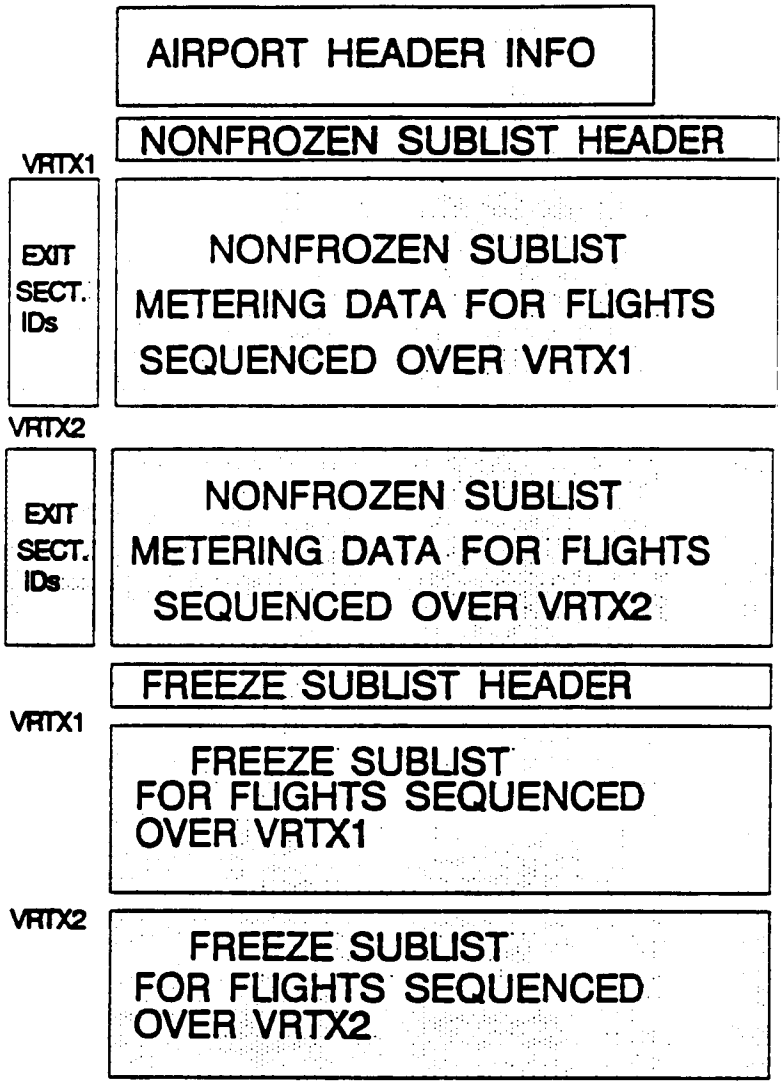


Figure 2-3. Illustration of ESP Metering Position List Format

Generally, when the TMC knows in advance that a particular airport configuration is going to change at a set future time, a corresponding future configuration change AD message should be entered. This is because flights will be sequenced at the appropriate current or future configuration based on their projected order at the airport. When advanced information is known, as it is frequently, entering future configurations may tend to cause a smoother operational transition on the en route center than would occur by waiting and entering an immediate airport configuration change.

2.3.1 Changing Airport Configurations

The AD message to change an airport configuration is described in detail in section 5.1.6. The format for this important AD message is repeated here, as follows:

AD (mapt) CON config_name (time)

Where:

mapt is an adapted ASP or ESP airport identifier.
config_name is an adapted ASP or ESP configuration.
time, if entered, is the commence time for a future configuration to take effect.

Once again, every TMC should have ready access to all configuration names and associated data that may be used during operations.

2.4 CHANGING THE VERTEX ACCEPTANCE RATE (VAR)

Matching the actual capacity of the airport terminal airspace to the runway vertex or to an ESP vertex is an important TMC task. The capacity of the various metering constraints is dynamic by nature and will change with conditions such as weather, airport configurations, time of day and traffic flow. In ESP/ASP, the capacity is expressed as the amount of acceptable airplanes per hour and is called the VAR.

As the various vertex capacities are changed, the airport header will reflect the new VAR values. Additionally, the metering flight sequence will change to reflect the new VAR values. For example, from a VAR of 60 to 30, the assigned sequence would be spread out from one airplane per minute to one airplane every two minutes at that vertex. The TCLT, TCVT, ACLT and/or ACVT and other metering assigned times (MFT and OFT) would reflect this new spacing of flights. This spacing, in time between airplanes, is called the Aircraft Arrival Interval (AAI) at a given vertex and can be computed as:

$$AAI = 60/VAR$$

Where:

AAI = Aircraft Arrival Interval, in minutes per airplane.
VAR = Vertex Acceptance Rate, in airplanes per hour.

The specific AD message to change a VAR is described in detail in section 5.1.5. The general format of the AD messages is as follows:

AD (mapt) (vertex) VAR ddd (time)

Where:

mapt is an adapted ASP or ESP airport identifier.
vertex is an adapted ASP or ESP vertex identifier of two to five characters.
ddd is the desired vertex acceptance rate (flights per hour), leading zeros are required, such as 030.
time, if entered, is the commence time at which the entered VAR is to take effect and is entered in hours (00 to 23) and minutes (00 to 59).

2.5 BRIEF SUMMARY OF ALL AD MESSAGE FORMATS

Since this section is only intended to serve as an introduction to get the TMC started, all of the AD messages will not be covered in detail here (see section 5). However, for convenience, the general format of all of the ESP/ASP metering AD messages is shown in table 2-1.

Table 2-1
Summary of AD Message Formats

- Display Related **AD** Messages

  1. Request Metering Position List
     AD mapt ON
  2. Suppress Metering Position List
     AD (mapt) OFF
  3. Request ASP Sector Metering List
     AD (aapt) LST
  4. Suppress ASP Sector Metering List
     AD (aapt) NST

- Airport/Airspace Capacity Related **AD** Messages

  5. Change Vertex Acceptance Rate
     AD (mapt) (vertex) VAR ddd (future time)
  6. Change Airport Configuration
     AD (mapt) CON Config_name (future time)
  7. Apply an Arrival Delay
     AD (mapt) (vertex) ADLY delay time
  8. Combine Airports
     AD focal_mapt/peripheral_apt[+ peripheral_apt]...
  9. Decombine Airports
     AD focal_mapt/focal_mapt
     AD peripheral_apt/peripheral_apt

- Airport/Airspace Demand Related **AD** Messages

  10. Manually Assign a Flight
      ASP: **AD (aapt)(mfix) time (T) flight_id**
      ESP: **AD (eapt)(vertex) time (T) flight_id**
  11. Manually Delete an Entry
      AD (mapt) flight_id
  12. Manually Swap Sequenced Positions of Two Flights
      AD (mapt) flight_id flight_id

All fields in parentheses may or may not be optional, depending upon the particular circumstance. See section 5 for specific details on each message.

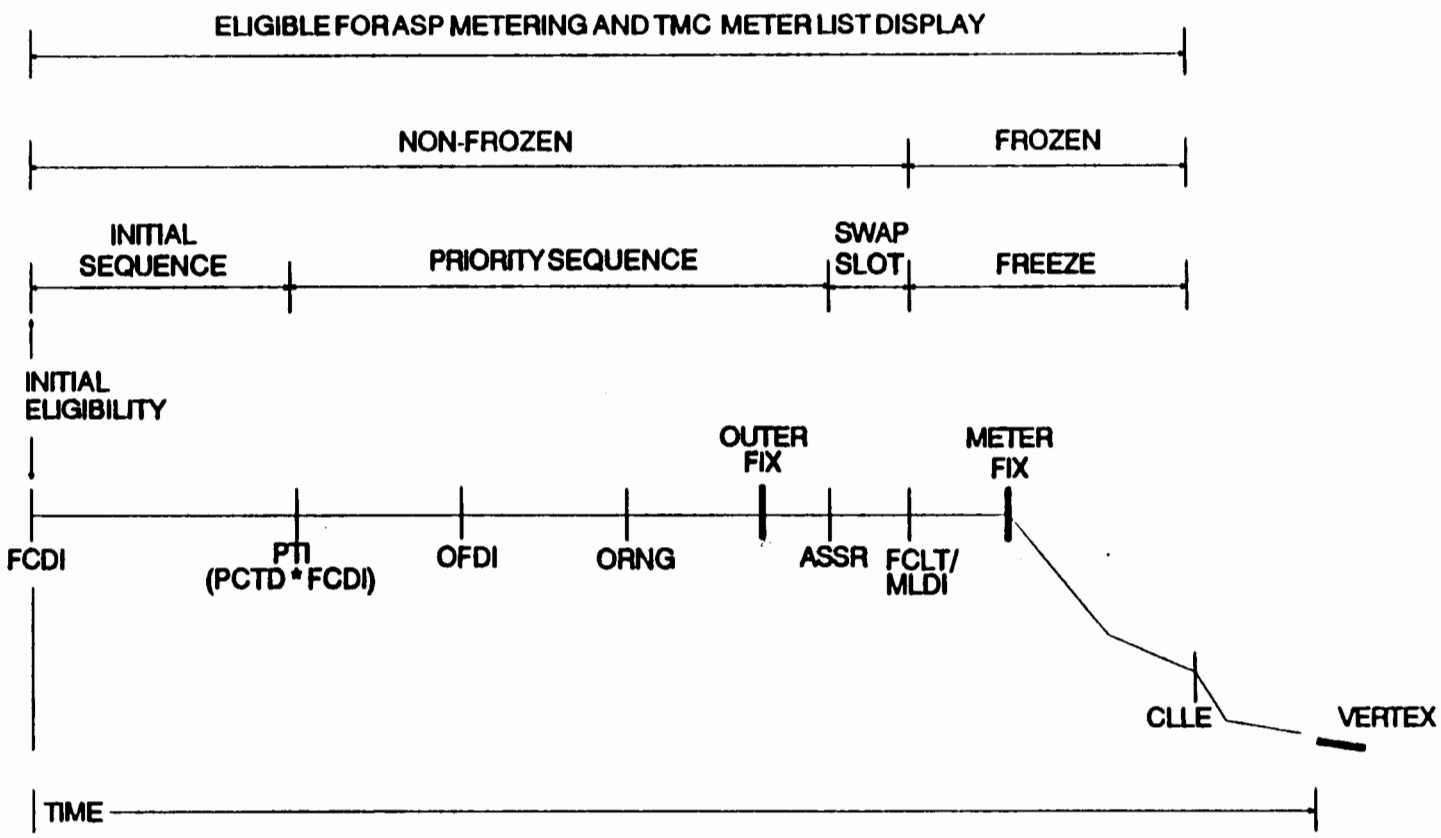
SECTION 3

FUNCTIONAL SUMMARY OF ESP/ASP

This section summarizes the ESP/ASP software release. The goal of ESP/ASP is to provide a metering automation program that will support the traffic management operational needs of a given center and also be flexible to adapt to the unique environment of each center. The flexibility of ESP/ASP can be exercised through the use of adaptable and changeable parameters that turn on and off features, set the various metering regions and set other metering criteria. The ESP/ASP enhancements are summarized here, followed by a more detailed functional description of ASP and ESP.

Priority and Sequencing: The baseline ERM-1A function sequenced and assigned Calculated Landing Times (CLTs) based upon each flight's VTA at a metered airport. This caused frequent resequencing of non-frozen flights due to any updates of a flight's time which caused the VTA to change. In some instances, this resulted in a problem that as flights were delayed, some were penalized because their assigned TCLTs were reassigned to later times based on updated VTAs. In this problem, flights that did not take delay, and as a result had earlier VTAs, were sequenced into the earlier slot left vacant.

To resolve the problem, the ESP/ASP enhancement called Priority addresses the need to "remember" the undelayed VTA and undelayed MFT (if ASP) at the instant that a flight reaches the priority region of metering. Figure 3-1 shows the priority region in relation to the other parameterized regions of metering. Thus, as a flight takes delay, the metering program "remembers" its priority in relation to other non-frozen flights in metering. As long as no airport condition changes, no new TCLT/TCVT is assigned unless the flight can no longer meet the assigned TCLT/TCVT or new flights enter metering with an earlier priority. It will be possible for the TMC to change the sequence of flights by either manually reassigning metering times, or by manually swapping the priority of two flights destined to a common vertex.



NOTE: This diagram is for illustartion purposes only. The actual setting of these parameters depends upon the airport and situation being addressed.

Figure 3-1. Parameters and ASP Metering Regions in Time

Automatic Swap Slot Region (ASSR): While flights are in the above ASP and ESP priority region, the metering assigned order may not always represent the actual order at any given time. This is because some flights may be taking assigned delay while other metered flights have not yet taken delay. The metering sequence reflects the prioritized order of flights while they are in the priority region as shown in figure 3-1. While in the priority region, the sequencing effect is beneficial because it gives an opportunity for the metering plan to be carried out.

At some region of metering, usually just before the freeze region, it may be desirable for the metering assigned order to reflect the actual sequence of flights destined to the same meter fix and vertex. This region, also shown in figure 3-1, is called the Automatic Swap Slot Region (ASSR), is set in adaptation and can be changed on-line via the CP message. The ASSR parameter is referenced as minutes from freeze time.

Tracking Data Option: For ASP and ESP a feature allows a region to be adapted (by the Outer Ring (ORNG) parameter), where metering VTAs are calculated based on tracking data alone. For ASP metered flights within a TMC selected distance from the meter fix, the VTAs are calculated by using the tracked x-y position and by projecting the flight to the associated meter fix using an averaged tracked ground speed. To descent adjust the predicted meter fix time, downward speed averaging is used to project the flight from the transition point to the meter fix.

For ESP, tracking data will also be used to calculate the VTA if the flight is within the selected distance from the defined ESP vertex. For both ASP and ESP flights within the specified regions, all VTA will be periodically calculated in the above manner. Thus, VTA updates will occur for FREE tracks, as well as FLAT tracks. The tracking data region is specified by the ORNG parameter as illustrated in figure 3-1. Setting ORNG to zero will disable the tracking data calculations and metering will return to calculating metering times based on NAS flight plan association.

Manual Assignment Modification: The baseline ERM-1A only permitted a manual assignment of ACLTs for flights to be placed in the frozen sublist. If the flight was previously unfrozen, a manual ACLT assignment to that flight would place it on the frozen sublist. ASP and ESP provide the TMC greater flexibility to reserve arrival slots by permitting manual assignment for both the frozen and non-frozen arrival slots. Manual assignments are made via an AD message for a flight with an existing flight plan or for an aircraft without a flight plan. For ASP, a VTA and meter fix time priority will be calculated for a manual assignment. For ESP, a vertex priority value will be calculated for a manual assignment.

Multiple Vertices: The baseline ERM-1A program addressed only one vertex per airport. Many airports use a number of runways simultaneously for separate and independent arrival and departure operations. ASP enhancements will allow up to four metered vertices for a particular airport runway configuration. Each vertex will use separate VARs set by the TMC.

Sector List Modifications: Baseline ERM-1A provided the meter and outer fix sectors with a meter list which contains AIDs, meter/outer fix times, and the assigned delay (if any) for each arriving aircraft on the list. Aircraft are grouped by fix (meter or outer) and the meter list header contains the airport identification, current runway configuration, and the Airport Acceptance Rate (AAR). ASP will modify the sector list information by deleting the current runway configuration and the AAR, and by adding heavy jet and freeze list indicators for each entry on the list (if appropriate). The displayed delay (either positive or negative) will count down as flights approach their assigned meter/outer fix times (i.e., take assigned delay).

Intercenter Flight Plan Transfer: In situations where ASP metered airports are located close to center boundaries, it is beneficial for the metering function to receive flight plans from the adjacent center earlier than is currently provided for by the existing Active Boundary Crossing Time (ABCT) parameter. The transfer of intercenter flight plan data is provided earlier for a more timely transfer of flight plan data between centers. The parameter used to accomplish this is called the Metering Boundary Crossing Time (MBCT) parameter and is adapted in ACES.

Refined Time Updates: The current NAS longitudinal association checking processing generates time updates to NAS Calculated Time of Arrivals (CTAs) to reflect differences between the flight plan extrapolated position and the track position. These times are too coarse for metering to use to accurately predict arrival sequences and times.

The purpose of this feature is to provide the metering function with more accurate flight times. This is accomplished by improving the granularity of the CTA updates for metered flights within the local center, and within adjacent centers that supply the local center with Metering Updates.

Host Computer to TMU Workstation Interface: In order to enhance its flexibility, ASP will provide a one way interface (Host to TMU) between the Host computer and the TMU workstation, to off load metering data to the TMU computer. This data may be used to drive an alternative MLD device (if available) and/or could provide meter list data to associated towers and Terminal Radar Approach Control Facilities (TRACONs). This would only be possible if appropriate hardware and software is provided on the TMU computer side.

Eligibility of Meter Fixes: The FAA staff in some centers have identified an ERM-1A limitation where non-center meter fixes are not eligible for the assignment of MFTs in metering. To resolve this, ASP will allow a meter fix, adapted as an approach control fix, to be eligible for the sequencing of metered flights. A processing check will also be applied to assure that the program will not attempt to display meter fix sector lists for the flights projected over non-center meter fixes.

Hold Processing: In ESP/ASP, metered flights for which the "HOLD" message has been applied will remain in the metering sequence. The symbol "H" will be displayed to the left of the AID in the metering position list for a metered flight in hold. The symbol "H" will also be displayed to the left of the AID in any sector list displaying a metered flight in HOLD.

Combine/Decombine Airports: In ERM-1A, both primary and peripheral airports may be adapted separately as metered airports. When combined with a primary airport, peripheral airport flights will be merged sequentially with entries in the metering position list, the meter fix list, and the outer fix lists for the primary airport. Decombining will separate these flights into their respective lists. In ASP and ESP, all peripheral airports must be adapted as being associated with a primary airport. No other metering adaptation is set for these peripheral airports. When a decombined message is entered, these flights destined to the peripheral airport are deleted from metering.

Requalify Flights: In the baseline ERM-1A metering function, there existed a message to manually delete a flight from metering processing. This message removed a metered flight from the metering database and prohibited the flight from being considered for further metering purposes. In ESP/ASP the TMC has the capability to allow the manually deleted flights to be reprocessed by metering. Basically, the flight can be manually, reassigned to either a non-frozen or frozen time via the manual assign AD message.

3.1 THE ASP METERING FUNCTION

The ASP function is used by the TMC and selected sector controllers to aid in meeting arrival fix times, and properly sequencing aircraft for landing at an airport or group of airports internal to the ARTCC. This program is based on the existing ERM-1A enhanced to provide greater utility to the TMC and sector controllers.

The TMC uses ASP to sequence flights and to space the flights destined to metered airports in the ARTCC into orderly flows, such that the airport (or surrounding airspace) capacity will be met but not exceeded. In addition to maximizing use of the airport's capacity (especially during heavy traffic), ASP endeavors to distribute necessary delay for aircraft throughout all affected sectors in the center, so that the arrival sector (or terminal airspace) does not become too heavily burdened.

ASP establishes priority (a new feature), sequences arrival flights, and displays the sequenced flights in a meter list based upon a projected time of arrival at an ASP vertex. This vertex arrival time for metering purposes is called the VTA. Metering arrival times are assigned to each flight at the vertex, the meter fix, and a designated outer fix such that the arrival demand matches the airport capacity as defined by a TMC entered AAR. As another new capability, for airports which are configured with two or more vertices (up to four), a separate prioritized sequence and meter list can be established for each vertex. These meter lists are displayed at the TMC position.

The ASP vertex is a point of reference located on or near the arrival runway(s). The meter fix is a NAS fix located near the en route/terminal boundary. One or more outer fixes can be associated with each meter fix. These outer fixes are also NAS fixes.

The metering times calculated by ASP at the vertex, meter fix, and outer fixes are based upon the spacing required to meet airport capacity requirements. THe difference between the aircraft's projected arrival time (undelayed) and the metering calculated time at a fix is the delay required to be taken prior to arrival at the airport. A portion of this delay is assigned to be taken between the outer fix and meter fix with the remaining delay to be taken prior to the outer fix. The delay can be forwarded to the appropriate meter or outer fix sector controllers for implementation.

The TMC oversees the arrival sequence and assigned delays, and can manually modify the sequence, if necessary. All metering messages are entered as AD messages at the metering position PVD or as CP messages at the supervisor's KVDT in the Host.

The metering process for both ASP and ESP is TMC initiated by setting the Metering Activation Switch (METR) parameter to ON via a CP message. Either ASP or ESP can be effectively deactivated by appropriate parameter settings (e.g., setting the Flow Control Display Interval (FCDI) parameter for specific airports).

The following sections highlight the primary functions and enhancements for ASP processing.

3.1.1 Determine Eligibility of Flights for ASP Processing

An eligibility check will be made periodically on all aircraft to determine which flights are eligible for ASP metered airport processing. The following are the eligibility criteria:

1. Flight must be active.
2. A newly eligible flight must not be in hold status.
3. The flight plan must not be filed as VFR status.
4. Flight must not be a Dynamic Simulation (DYSIM) flight.
5. The flight destination must be an ASP metering airport.
6. Flight must be within FCDI[1] parameter minutes of the NAS CTA at the destination airport.

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[1] The FCDI parameter is adapted per metered airport and can be modified via a CP message. If FCDI = 0, no flights will be processed.

This process is followed for each vertex in a multiple vertex configuration.

3.1.2 Determine Vertex

After a flight has passed all eligibility criteria, ASP determines at which vertex, if any, the flight will be sequenced. An ASP eligible flight will be checked to determine if it is routed over a meter fix for the destination ASP airport. Flights that have an adapted meter fix in their route will be assigned the vertex having that meter fix adapted. Flights not routed over a meter fix and flights which have an invalid meter fix for the airport configuration are considered NOFIX flights. For a multiple vertex configuration, no vertex assignment will be made for NOFIX a flight. For a single vertex configuration, a NOFIX flight will be assigned the vertex for the configuration.

3.1.3 Calculate Vertex Time of Arrival

After the ASP vertex has been determined, a VTA will be calculated. The VTA for flights with an assigned meter fix will be based upon the descent adjusted meter fix time calculation. The VTA will be set equal to this meter fix time, plus the meter fix to vertex time computed using adapted speed segments.

The descent-adjusted meter fix time will either be the NAS generated CTA at the meter fix, or the NAS generated CTA adjusted by adding the difference between the NAS calculated time and the metering calculated time to fly from the transition point to the meter fix (using speed segment calculations). This determination is made by comparing the filed True Air Speed (TAS) to the adapted airspeed at the meter fix and transition points.

For NOFIX flights in single vertex configurations, the flight plan CTA at the destination airport will be considered the VTA.

3.1.4 Set Sequence Priority (*NEW FEATURE*)

Priority is a new technique used in metering to maintain sequence stability in ASP and ESP metering lists. A priority ranking is established for each ASP flight using the undelayed meter fix time and the VTA to preserve the flight's assigned order as delay is absorbed.

The MFT priority value is set equal to the undelayed MFT and the VTA priority is set equal to the VTA when an aircraft is at or within Priority Control Time Interval (PCTI) minutes of the vertex. If the priority value has already been assigned to another flight, 0.01 minutes will be added to the VTA and MFT priorities. PCTI is a fraction of FCDI and is obtained by multiplying FCDI by the value of Priority Control Time Determination (PCTD) adapted for the airport.

After the priority values are established for a flight, they may be modified for the following conditions:

1. A configuration change message.

2. A manual swap message.

3. A manual assignment.

4. An automatic swapping of priority.

5. A route amendment to the same airport.

6. A change to priority region (i.e., parameters PCTD, ASSR, FCDI and Freeze Calculated Landing Time (FCLT)).

For those flights which have not yet reached the priority region (i.e., PCTI minutes of the vertex), the meter fix priority and VTA priority values will dynamically change whenever the undelayed meter fix time and VTA are updated. When PCTD is set to zero, the priority values will also be updated with the undelayed meter fix time and VTA updates.

NOFIX flights in a single vertex configuration will have a priority value based on the VTA only. For a multiple vertex configuration, no priority values will be established for NOFIX flights, which have not been manually assigned to a selected time slot.

Figure 3-1 shows the location of the priority region in relation to the other parameterized regions of metering.

3.1.5 Sequence Aircraft at Vertex

After an initial meter fix and vertex priority value has been established (may be frozen or non-frozen), the flight can be sequenced at the vertex.

Each vertex has an associated capacity, expressed in flights per hour, called the VAR. The VAR determines the Aircraft Arrival Interval (AAI); AAI is the minimum time that must elapse between aircraft in the

Calculated Landing Sequence (CLS). Every flight currently in the CLS has an associated CLT (either a TCLT or an ACLT), which is the time that the flight is assigned to arrive at the vertex.[2]

The calculation for CLT uses a new adapted Priority Tolerance (PTOL) parameter. PTOL permits an aircraft to arrive at the vertex ahead of its VTA when metering is first activated or when the actual arrival demand is less than the specified arrival rate VAR. This capability serves to "push through" or "expedite" aircraft at the head of the stream in order to fully utilize the arrival slots. This will result in a negative delay (up to three (3) minutes depending upon the value of PTOL), displayed to the affected flight.

Thus, for sequencing purposes, the new CLT is set equal to either the previous CLT plus the AAI, or the flight's VTA-PTOL, whichever is greater. Figure 3-2 shows a portion of a possible arrival sequence (five (5) flights) with each flight's VTA, CLT, resultant delays, and the effect of PTOL in determining the CLT. The PTOL parameter is changed via a CP message.

The CLT of the flight is frozen when the flight progresses within a parameter number of minutes (i.e., either FCLT or Meter List Display Interval (MLDI)) of the meter fix. Before the CLT is frozen, it is referred to as TCLT; after the CLT is frozen it is referred to as ACLT. Any of the following events could cause TCLTs or ACLTs to change:

1. Airport configuration, VAR, or Arrival Delay changes (via an AD message).

2. Peripheral airports are combined or decombined.

3. A flight is manually inserted into or deleted from the CLS (via an AD message).

4. Sequence slots are swapped manually (via an AD message).

5. The parameters PTOL, PCTD, FCLT or MLDI are changed (via a CP message).

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[2] The CLT should not be confused with the VTA. The VTA is the time the aircraft is <u>projected</u> to reach the vertex if the vertex had unlimited capacity. The CLT is the time the aircraft is <u>assigned</u> to reach the vertex given the capacity restriction.

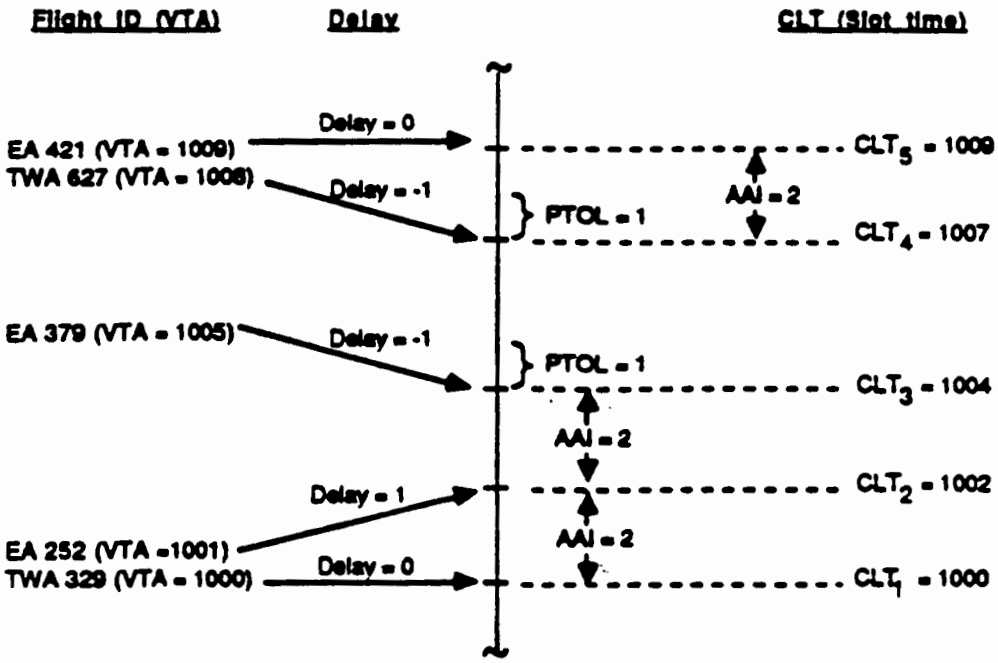


Figure 3-2. Example of Arrival Sequence

Additionally, any of the following events could cause a TCLTs to change:

1. Sequence slots are swapped automatically, or the ASSR is changed (via a CP message).

2. A flight VTA changes such that the flight is no longer eligible for the TCLT (that is, the computed VTA-PTOL is later than the assigned TCLT and the flight was not manually assigned).

3. A flight is automatically added to or deleted from the sequence.

3.1.6 Manually Assigned Flights (*NEW FEATURES DISCUSSED HERE*)

ASP allows the TMC to manually assign arrival slots for flights without active flight plans (e.g., proposed flights), and to manually reassign arrival slots to flights which are already sequenced in metering. These manual assignments can be made for flights on the frozen list (assignment of ACLTs). Additionally, as a new software feature, the manual assignments can be made for flights on the non-frozen portion (tentative) of the metering list (assignment of TCLTs). The reader is referred to section 5 for format details of the input AD messages for manual assignments.

All flights manually assigned or reassigned TCLTs and ACLTs will be displayed on their respective frozen or non-frozen sublists. A "◇" symbol will appear to the left of the AID. The flight will be sequenced by TCLT or ACLT with other entries in the appropriate sublist within the meter fix group (in the non-frozen sublist) or by vertex (in the frozen sublist). If the manually assigned flight has no flight plan data, no times will be displayed except for the manually assigned TCLTs or ACLTs.

An existing flight in metering (i.e., available flight plan) whose TCLT or ACLT was manually reassigned, will have its VTA, meter/outer fix times (if available), and delay calculated and displayed. Its priority and sequence will be recalculated and reassigned based upon the changed data and the "◇" symbol will be displayed. If the flight is required to alter its course or speed up to meet the earlier TCLT/ACLT (VTA-PTOL is later than TCLT/ACLT), the "◇" symbol and a negative delay will be displayed.

When a proposed flight, which was manually assigned an ACLT or TCLT becomes active, its VTA, meter/outer fix times (if available), and delay are calculated and displayed. Its original sequence and priority will be maintained and the "◇" remains displayed. If the flight is required to alter its course or speed up to meet the earlier TCLT/ACLT (VTA-PTOL is later than TCLT/ACLT), the "◇" remains and a negative delay will be displayed.

If a configuration change occurs, flights without a flight plan which were manually assigned to a vertex in the previous configuration that is no

longer valid in the current configuration will become NOFIX flights and be moved to the NOFIX portion of the non-frozen sublist.

Generally, upon any event that causes resequencing of metered flights, the frozen manually assigned times will be reassigned to ACLTs which are closest to the manually assigned time prior to the resequencing while preserving the AAI and arrival delay (if any). Non-frozen manual assignments are initially sequenced at the manually assigned TCLT while preserving the AAI and arrival delay (if any).

A main difference from frozen manual assignments is that for non-frozen manual assignments, subsequent flight entries may cause the manually assigned times to be resequenced. New flights with earlier priorities may push back and resequence the tentative manually assigned flights. The manually assigned non-frozen flights are in a way more dynamically sequenced, with the other non-frozen flights in the meter list. Additionally, during events that cause resequencing, the manually assigned non-frozen flights will be resequenced dynamically with the other flights. This means that they will be shifted earlier or later with the other non-frozen flights. Manually assigned flights will not be assigned or resequenced into time slots earlier than the manually entered time.

3.1.7 Automatic Swap Slots (*NEW FEATURE*)

As a flight progresses through metered airspace, it may be desirable to sequence non-frozen flights by the actual projected order at the ASP vertex. This happens when the set priority is no longer an accurate representation of how the flights will arrive. Automatic swapping occurs when the flight is at or within ASSR minutes prior to freeze. If ASSR or PCTI is zero (0), no automatic swapping will occur.

The following criteria must be met for ASP metered flights to be eligible for automatic swapping:

1. The flight is non-frozen, and at or within ASSR minutes, and within PCTI minutes of the assigned vertex.

2. The flight is in Flight Plan Aided Tracking (FLAT) track status or eligible for tracking data calculations.

3. The flight is not a manual assignment.

4. Both flights are assigned the same meter fix and use the same approach path to the vertex.

5. The time to fly from the meter fix to the vertex calculated for each of the two flights must not differ by more than 0.5 minutes.

6. The flight is not a NOFIX flight.

For flights which meet the eligibility requirements, swapping will occur as follows:

1. The undelayed sequence at the meter fix (using undelayed meter fix times) will be compared to the metering assigned meter fix order which is displayed. This comparison will be initiated by the entry of an ASP aircraft eligible for ASSR processing and/or events which cause changes to meter fix times (assigned and undelayed) for other metered aircraft.

2. If the order indicated by the undelayed meter fix times is different than the displayed order by meter fix time, the meter fix priority values and VTA priority values will be swapped.

3. The flights will be reassigned TCLTs and resequenced using the new VTA priority values.

4. All metering times will be recomputed for the two flights (i.e., meter fix times and outer fix times.

The resulting display of new metering times will occur only after automatic swap processing is complete. Slots may also be swapped manually via an AD message.

3.1.8 Refine Metering Times (*NEW FEATURES*)

3.1.8.1 Flight Plan Data

As flight plan data is changed, metering refines the information of ASP metered flights if appropriate. A flight plan amendment could change the ASP vertex assigned (route change) and/or the VTA at the vertex (route, aircraft type, speed, time). These changes could induce a change in sequence or CLT. A flight plan change may cause a flight to be no longer eligible for ASP metering (route change, altitude change), in which case the non-frozen flights would be deleted from metering. The frozen flights would remain assigned to the ACLT, with a down arrow displayed to the left of the AID/CID.

Flight plan data is also used to perform Longitudinal Association Checking (LAC) against FLAT track data. Time updates may be calculated if the FLAT track data deviates from the flight plan information. If a time update calculated from either flight plan changes or LAC is greater than Flow Time Update Interval (FTUI) parameter, then the metering times will be updated.

3.1.8.2 Track Data

Track data may be used to dynamically refine the VTA for ASP metered flights. The VTA from track data will replace the VTA from flight plan data. When the VTA for an ASP metered flight is being calculated using track data, no flight plan updates to the vertex time will be used for this flight. Track data will be used if all of the following conditions are met:

1. A NAS track exists for the metered flight in the ASP center.

2. The track velocity is nonzero.

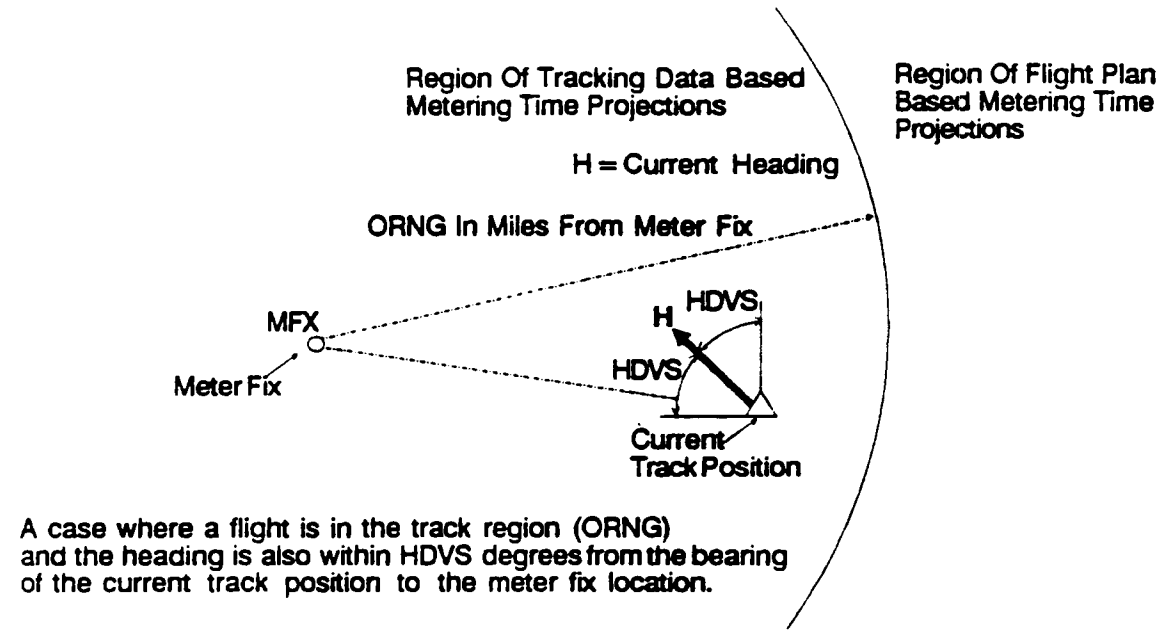
3. The current track position is within the ORNG distance of the ASP meter fix. ORNG is adapted per ASP metered airport. If ORNG is zero (0), no track data calculations will be performed. NOFIX flights are not eligible for track updates.

4. If the flight is in FLAT track, the track status must be en route.

5. If the flight is in FREE track, the track heading must be within the Heading Deviation Allowable to Perform Velocity Smoothing (HDVS) degrees of the heading of the metered aircraft from the current track position to the meter fix (e.g., the absolute value of the current flight track heading <u>minus</u> the bearing angle of the line connecting the meter fix with the current track position <u>must be less</u> than <u>HDVS</u>). HDVS is a parameter adapted for the center. Figure 3-3 illustrates the case of an aircraft heading being within HDVS and also a case where the HDVS criteria is not met.

6. If the flight satisfies all the above criteria, the flight will be eligible for track data calculations. If the flight was in TURN when within ORNG distance of the meter fix, the flight becomes eligible when the turn is complete and the Subcycles After Turn Before Velocity Smoothing (STVS) parameter has been executed (number of subcycle specified by STVS has been completed). The track mode can alternate between FLAT or FREE during STVS countdown. STVS is adapted per center.

If the flight is eligible for track data refinements, flight plan updates will not be applied. Flights eligible for track updates will have a VTA update value calculated every Metering Time Update Interval (MTUI) minutes, where MTUI is an adapted center parameter. For an aircraft in



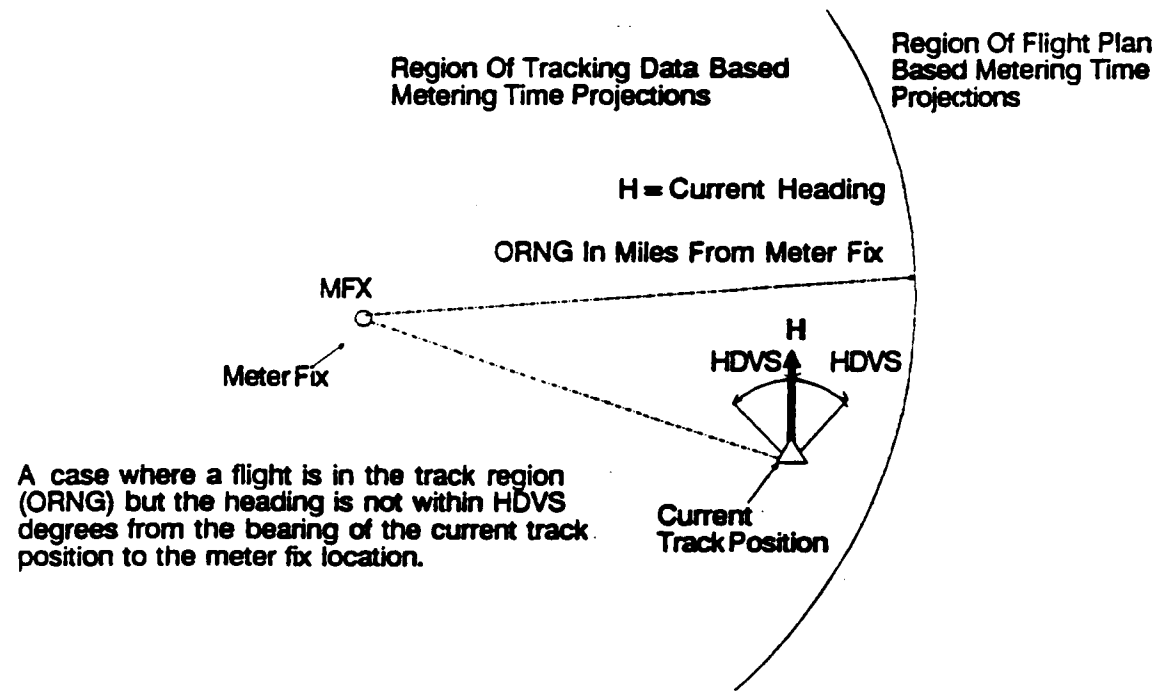


Figure 3-3. Example Of HDVS Application In Tracking Data Calculation

hold status, the update value will be one (1) minute for each minute in hold. If the flight is not in hold, a smoothed velocity (descent adjusted if a descent point is adapted) is used to calculate the expected time at the meter fix. The VTA update value is the difference between the expected time at the meter fix and the undelayed meter fix time.

If the absolute value of the update time value calculated is less than or equal to the Metering Time Update Threshold (MTUT) minutes, then the VTA is not changed.

If the flight is in hold status, the entire VTA update value is added to the current VTA to obtain the new VTA. If the track mode for the flight is FREE and the track heading is no longer with HDVS degrees of the heading from the flight's current track position to the meter fix, only a portion of the update value will be added to the old VTA. The Free Track Calculated Vertex Time Percentage Update (FCPU) parameter determines what portion of the update value will be applied. In all other cases, the entire update value is applied to the old VTA to obtain the new VTA.

3.1.9 Deletions

Entries will be deleted from the ASP metering position under any of the following conditions:

1. The flight is at Calculated Landing List Eligibility (CLLE) minutes prior to its CLT.

2. The flight plan is cancelled.

3. The destination is changed, for non-frozen flights.

4. Entry is manually deleted.

5. Flight is associated with a decombined peripheral airport.

3.2 THE ESP METERING FUNCTION

ESP metering is used by the TMC to aid in meeting restrictions placed on the center by a downstream center for aircraft destined to a particular airport or group of airports. The destination airport is referred to as an ESP metered airport. Restrictions in ESP are expressed as a capacity rate (flights per hour).

The TMC uses ESP automation to help organize flights destined to metered airports into an orderly flow of traffic so capacity will be met and not exceeded. One objective of ESP automation is to help the TMC and controllers meet a downstream center rate restriction without placing the entire metering burden on the exit sector controller.

ESP works by calculating projected arrival times for eligible flights at a common reference point called an ESP vertex, establishing a sequence priority, and then sequencing the flights at the vertex. The ESP vertex is a NAS fix generally located near the center boundary in the downstream center. A metering time is then calculated based on the spacing required to satisfy a rate restriction. The difference between the metering time and the projected arrival time is the required delay.

The TMC monitors the sequence and delays, and then suggests appropriate maneuvers to area managers or sector controllers. The TMC also uses the sequence to coordinate departure times for aircraft entering the system. These departure aircraft are manually inserted into the sequence.

For any metering processing to occur (ASP or ESP), metering must be activated. Metering is activated by setting METR ON via a CP message.

3.2.1 Determine Eligibility

The first step in the metering process is to determine the eligibility of the flight. The following are the ESP eligibility criteria:

1. Flight must be active.

2. Newly eligible flight must not be in hold.

3. Flight must not be filed as VFR status.

4. Flight must not be a DYSIM flight.

5. Flight destination must be an adapted ESP airport.

6. Flight must be within FCDI[3] minutes of the NAS CTA at the projected Boundary Crossing Point (BCPT).

7. Flight must be at or above En Route Spacing Altitude Filter (ESAF)[4] feet. If the aircraft has an assigned altitude block, the higher limit must be at or above ESAF.

---

[3] The FCDI parameter is adapted per metered airport and can be modified via a CP message. If FCDI is zero (0), no flights will be processed.

[4] The ESAF parameter is adapted per metered airport and can be modified via a CP message.

3.2.2 Determine Vertex

After a flight has passed eligibility criteria, it may be assigned to an ESP vertex. An ESP vertex is a NAS fix which is generally near the center boundary and located in the downstream center. It is used as a reference point for metering flights. There may be more than one vertex per metered airport.

Each ESP vertex must be interior to a "Vertex" wedge defined by rays extending from the airport to two (2) adapted points P_1 and P_2 (see figure 3-4). P_1 and P_2 are defined by their bearing angles (ϕ_1 and ϕ_2), measured clockwise from NORTH (0-360°) in the direction of each ray from the center boundary to the airport. An airport configuration can have up to four (4) adapted ESP wedges, each with an associated ESP vertex.

The bearing from the projected BCPT to the destination airport is calculated and compared with adapted bearing angles ϕ_1 and ϕ_2. If the BCPT to airport bearing angle falls between ϕ_1 and ϕ_2 for the defined ESP vertex wedge, then the flight is sequenced at the ESP vertex. Flights not falling within any adapted ESP vertex wedge are No Vertex (NOVRTX) flights and are not sequenced.

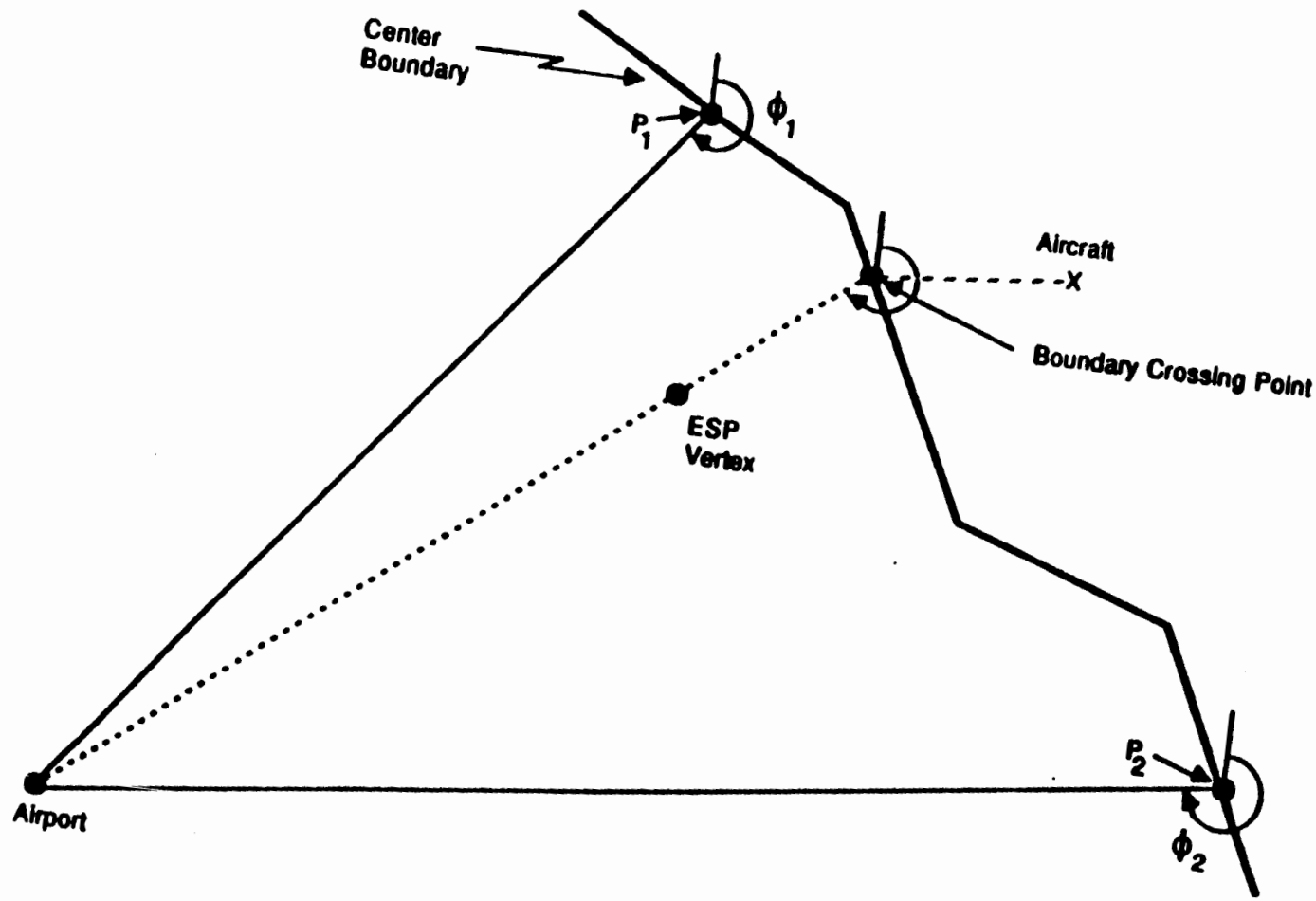


Figure 3-4. ESP Vertex Wedge

3.2.3 Calculate Vertex Time of Arrival

When an ESP vertex has been determined, a projected VTA will be calculated. (VTA will not be calculated for NOVRTX flights.) If the vertex is a converted fix on the converted route for the flight and a NAS CTA exists for that fix, the VTA is set equal to the NAS CTA.

If a NAS CTA does not exist for the vertex, the VTA is computed by projecting a route segment from the projected BCPT to the ESP Vertex. The filed true airspeed along with the wind velocity and heading at the BCPT, the uncorrected point-to-point bearing, and the heading correction at the BCPT is used for ground speed calculation. The ground speed value, the BCPT coordinates, and the vertex coordinates are used to calculate the flying time to the vertex. The flying time is added to the NAS CTA at the BCPT to obtain the initial VTA.

3.2.4 Set Sequence Priority

As with ASP flights, ESP flights are also assigned a priority ranking. The VTA priority value is used to preserve the assigned order while flights absorb delay.

The VTA priority is set equal to the VTA when an aircraft is at or within PCTI minutes of the vertex. If the priority value has already been assigned to a flight, 0.01 minutes will be added to the VTA priority value. PCTI is obtained by multiplying FCDI by the parameter PCTD adapted for the ESP airport.

Once the priority values are established for a flight, the values may be modified for the following conditions:

1. A configuration change message;
2. A manual swap message;
3. A manual assignment;
4. An automatic swapping of priority; or
5. A route amendment to the same airport.
6. A change to priority region (i.e., parameters PCTD, ASSR, FCDI and FCLT are modified).

For a flight which has not progressed within PCTI minutes of the vertex, the VTA priority value will be set equal to the VTA whenever the VTA is updated. When PCTD is zero (0), the VTA priority will also be updated with VTA updates.

Since NOVRTX flights are not sequenced, priority values are not necessary for these flights.

3.2.5 Sequence Aircraft at Vertex

After an initial priority value has been established (may be frozen or non-frozen), the flight can be sequenced at the vertex.

Each vertex has an associated capacity, expressed in aircraft per hour, called the VAR. The VAR determines the Aircraft Arrival Interval (AAI); AAI is the minimum time that must elapse between aircraft in the Calculated Vertex Sequence (CVS). Every flight currently in the CVS has an associated Calculated Vertex Time (CVT), which is the time the flight is assigned to arrive at the vertex.[5]

The calculation for CVT uses an adapted PTOL parameter. PTOL permits an aircraft to arrive at the vertex ahead of its VTA when metering is first activated or when the actual arrival demand is less than the specified VAR. This capacity serves to "push through" or "expedite" aircraft at the head of the stream in order to fully utilize the arrival slots. This will result in a negative delay (up to three (3) minutes depending upon the value of PTOL), displayed to the affected flight.

Thus, for sequencing purposes, the new CVT is set equal to either the pervious CVT plus the AAI, or the flight's VTA-PTOL, whichever is greater (see the example in section 3.1.5). The PTOL parameter is changed via a CP message.

The CVT of the flight is frozen when the flight progresses within FCLT minutes of the ESP vertex. Before the CVT is frozen, it is referred to as TCVT; after the CVT is frozen, it is referred to as ACVT. Any of the following events could cause a TCVT or ACVT to change:

1. Vertex configuration or VAR changes (via an AD message).

2. A flight is manually inserted into or deleted from the CVS (via an AD message).

3. Sequence slots are swapped manually (via an AD message).

4. The parameters PTOL, PCTD, or FCLT are changed (via a CP message).

---

[5] The CVT should not be confused with the VTA. The VTA is the time the aircraft is projected to reach the vertex if the vertex had unlimited capacity. The CVT is the time the aircraft is assigned to reach the vertex given the capacity restriction.

Additionally, any of the following events could cause a TCVT to change:

1. Sequence slots are swapped automatically, or the ASSR is changed (via a CP message).

2. A flight VTA changes such that the flight is no longer eligible for the TCVT (that is the computed VTA - PTOL is later than the assigned TCVT and the flight has been manually assigned).

3. A flight is automatically added to or deleted from the sequence.

3.2.6 Perform Automatic Swap Slots

As a flight progresses through metered airspace, it may be desirable to sequence non-frozen flights by the actual projected order at the ESP vertex. This happens when the set priority is no longer an accurate representation of how the flights will arrive. Automatic swapping occurs when the flight is at or within ASSR minutes prior to FCLT. If ASSR or PCTI is zero (0), no automatic swapping will occur.

The following criteria must be met for ESP metered flights to be eligible for automatic swapping:

1. The flight is outside FCLT, at or within ASSR, and within PCTI.

2. The flight is in FLAT track status or eligible for tracking data calculations.

3. The flight must not be a manual assignment, including one with flight plan data indicating that the flight cannot meet the manually assigned time (i.e., has negative delay).

4. Both flights must be sequenced at the same vertex. Neither flight can be a 'NOVRTX' flight.

For flights which meet the eligibility requirements, swapping will occur as follows:

1. Actual order of VTAs is compared to the order of TCVTs. This comparison is initiated by any of the following events: a) the entry of a newly eligible flight for automatic swap processing; b) a change in VTA and/or TCVT of an existing eligible flight for automatic swap processing.

2. If the actual projected order based on VTAs is different from the order indicated by TCVTs, then the set VTA priority values will be swapped.

3. The swapping of set priority values will cause the assigned TCVTs to be swapped.

The resulting display of new metering times will occur only after automatic swap processing is complete. Slots may also be swapped manually via an AD message.

3.2.7 Refine Metering Times

3.2.7.1 Flight Plan Data

As flight plan data is changed, metering refines the information of ESP metered flights if appropriate. A flight plan change could change the ESP vertex assigned (route change) and/or the VTA the vertex (route, aircraft type, speed, time). These changes could induce a change in sequence or CVT if other eligibility criteria are met. A flight plan change could cause a flight to be no longer eligible for ESP metering (route change, altitude change), in which case the flight would be automatically deleted from metering. A flight plan cancellation would cause a flight to be deleted from metering.

Flight plan data is also used to perform NAS LAC against FLAT track data. Time updates may be calculated if the FLAT track data deviates from the flight plan information.

If a time update calculated from either flight plan updates or LAC is greater than FTUI, then the metering times will be updated. If the flight is eligible for track data refinements, flight plan updates will not be applied.

3.2.7.2 Track Data

Track data is used to dynamically refine the VTA for ESP metered flights. The VTA from track data will replace the VTA from flight plan data. When the VTA for an ESP metered flight is being calculated using track data, no flight plan updates to the vertex time will be used for this flight. Track data will be used if all of the following conditions are met:

1. A NAS track exists for the metered flight in the ESP center.

2. The track velocity is nonzero.

3. The current track position is within the ORNG distance of the ESP vertex. ORNG is adapted per ESP metered airport. If ORNG is zero (0), no track data calculations will be performed. NOVTRX flights are not eligible for track updates.

4. If the flight is in FLAT track, the track status must be en route.

5. If the flight is in FREE track, the track heading must be within the HDVS degrees of the heading of the metered aircraft from the current track position to the vertex. HDVS is a parameter adapted for the center.

6. If the flight satisfies all the above criteria, the flight will be eligible for track data calculations. If the flight was in TURN when within ORNG distance of the meter fix, the flight becomes eligible when the turn is complete and the STVS parameter has been executed (number of subcycle specified by STVS has been completed). The track mode can alternate between FLAT or FREE during STVS countdown. STVS is adapted per center.

If the flight is eligible for track data refinements, flight plan updates will not be applied. Flights eligible for track updates will have a VTA update value calculated every MTUI minutes, where MTUI is an adapted center parameter. For an aircraft in hold status, the update value will be one (1) minute for each minute in hold. If the flight is not in hold, a smoothed velocity is used to calculate a time to fly to the ESP vertex. The time to fly is added to the current time to obtain an expected time at the vertex. The update value is the difference between the expected VTA and the flight's current VTA.

If the absolute value of the update value calculated is less than or equal to the MTUT minutes, then the VTA is not changed.

If the flight is in hold status, the entire VTA update value is added to the current VTA to obtain the new VTA. If the track mode for the flight is FREE and the track heading is no longer within HDVS degrees of the heading from the flight's current track position, to the vertex, only a portion of the update value will be added to the old VTA. The FCPU parameter determines what portion of the update value will be applied. In all other cases, the entire update value is applied to the old VTA to obtain the new VTA.

3.2.8 Deletions

Flights will be deleted from ESP metering under any of the following conditions:

1. The flight is at or within CLLE[6] minutes prior to its CVT.

2. The flight plan is cancelled.

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[6] The CLLE parameter is adapted per metered airport and may be changed via a CP message.

3. For non-frozen flights, the destination is changed.

4. In a configuration change, flights which are marked with a down arrow and have ACVTs later than the time the configuration is to be in effect.

5. Entry is manually deleted (via an AD message).

6. Flight is associated with a decombined peripheral airport.

7. An altitude amendment which gives an altitude less than the ESAF parameter, for non-frozen flights.

SECTION 4

OPERATIONAL TASK CONSIDERATIONS

This section highlights some of the various roles of the TMC while employing the ESP/ASP automation aid. The TMC operational task considerations are discussed from the vantage of necessary coordination with other facilities, area managers and sector controllers.

4.1 GENERAL

This section describes how the metering automation may be used for some of the tasks that the TMC will be called upon to perform. In particular, these tasks are:

1. Monitoring the available ASP or ESP airport capacity and configuring the ASP and ESP automation to reflect actual conditions.

2. Monitoring the demand upon the ASP or ESP airport capacity and acting upon changes in the airport capacity or demand.

3. Merging proposed departure aircraft from local internal airports into arrival air traffic flows.

4. Coordination with area managers, sector controller and other facilities.

The following explains each of the above tasks in relation to usage of the ESP/ASP automation.

4.1.1 Monitoring and Entering Airport Capacity

In order for the calculated sequence and schedule times to be relevant, the specified ASP or ESP airport conditions used by automation must be matched as closely as possible to actual conditions. Thus, in order for metering projections to be relevant and accurate, it is important for the TMC to enter one or more of the following AD message types:

- Request Metering Position List (see section 5.1.1)
- Change Airport Configuration (see section 5.1.6)
- Change Vertex Acceptance Rate (see section 5.1.5)
- Enter Arrival Delay (see section 5.1.7)
- Combine Metered Airports (see section 5.1.8)
- Decombine Metered Airports (see section 5.1.9)

Another TMC goal is to be aware of future developments that may occur at the airport. For example, if it is known that the airport is going to change runway configurations, it is generally helpful to enter a future airport configuration change with a future effective time. Doing so would help the center's air traffic flows to be more continuous, rather than abrupt, as can happen with an immediate airport configuration change. Also, by entering a known future airport configuration change, aircraft in the metering list are then projected and sequenced to the true vertex, causing a more accurate representation of metering times.

The other situation to look for is immediate and future runway closures. In coordination with the terminal approach control manager, it may be determined that a particular runway will be closed. In this case, the arrival delay AD message may be entered with the effective time and period of anticipated runway closure. On those rare occasions where the whole airport is closed down to arrivals, the global ADLY message can be used, without the optional vertex field.

4.1.2 Monitoring Airport Capacity/Demand and Relevant TMC Actions

After the initial setup of metered airports with the appropriate airport configurations, VARs, and arrival delays (if any), it is important that the TMC monitor the developing sequence and schedule. For example, if the TMC sees that a particular meter fix suddenly has several more aircraft grouped under it than have other meter fixes, some load balancing action may be helpful. This means that the TMC will need to coordinate with area managers, sector controllers and possibly terminal approach managers to coordinate some route amendments of flights to less busy arrival sectors and meter fixes. This TMC initiated action may serve to distribute the sector controller workload and more efficiently process air traffic flows with reduced delays.

It should be noted that ESP/ASP automation responds automatically to flight plan data and amendments, so route amendments should generally be entered for flights being rerouted to other meter fixes. Those aircraft will then be resequenced automatically to the appropriate meter fix and associated vertex. After the route amendment is accepted and the rerouted aircraft is resequenced, then a manual reassignment of an alternative time slot can be entered, if so desired by the TMC.

In addition to the messages listed in the previous section, other relevant TMC actions deal with sequence maintenance. For example, if the TMC plans to have an alternative order of aircraft than sequenced by metering, the manual swap AD message may be used to re-order two flights in metering. Also, the manual assignment AD message may be used to reassign time slots to existing flights in metering. The specific messages that perform to sequence maintenance are:

- Manual Assign Message (see section 5.1.10)
- Manual Delete Message (see section 5.1.11)
- Manual Swap Message (see section 5.1.12)

The reader is referred to section 5 for details on the specific message formats and requirements for the above messages.

An area of automatic ESP/ASP sequence maintenance to be aware of is Automatic Swap Slot Region (ASSR) processing. If the ASSR parameter is set greater than zero, flights in this region will be automatically sequenced by metering in the projected VTA order. This reason for providing the option to set an ASSR region is to help assure that flights freeze in the projected order of approach to the ASP meter fix or ESP vertex. Remember that priority[1] processing will keep aircraft from automatically swapping order unless VTA updates show that a flight can no longer meet the assigned time slot (including PTOL). The purpose of the ASSR parameter is to override the prioritized order to reflect the actual order within the ASSR region of time, just before freeze. The reader is referred to section 3, section 5, and NAS-MD-11 for more details on ASSR and priority processing.

4.1.3 Coordinating Proposed Departures

The next main area of TMC operational tasks deals with the coordination of proposed departures from local airports into the air traffic flows of the center. In this mode of operation, the TMC is usually in coordination with tower personnel of the departure airport. Often, proposed departures with ESP restrictions and also departures to nearby local ASP airports will be coordinated before actual departure.

To use ESP/ASP automation in the management of these local proposed departures, the metering list can be scanned to determine any natural gaps in the arrival flows. One trick here is that if PTOL is set to 1 minute or greater then any natural gaps are indicated where flights show negative delay.

Also, proposed departures can be merged into the ESP or ASP metering list where no natural gaps exist. This means that, metered flights behind the coordinated departure, will be delayed such that the departing aircraft is merged into the overflight air traffic flows. Providing that the proposed departure can meet the chosen time slot at the reference vertex, an appropriate departure time can be coordinated with the tower.

After an appropriate ESP or ASP time slot has been selected the manual assignment message is entered for that aircraft identification. At the

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[1] The priority region is set by parameter PCTD. It may be set from 0 to 100.

option of the TMC, the manually assigned time may be entered into the nonfrozen or frozen sequence. Section 3.1.6, sections 6.3.2 and 6.3.3 discuss processing of manual assignments. The manual assignment message format and options are covered in section 5.1.10.

After the flight departs, metering automation will project and calculate the undelayed Vertex Time of Arrival (VTA) and associated assigned metering times. Provided that the active flight plan associates with the TMC entered ASP meter fix or ESP vertex, the flight will remain assigned to the manually entered time. If the flight must speed up to meet the manually entered time, then negative delay will be displayed. The TMC should be aware of this processing and be prepared to manually reassign the flight, if it is determined that changing the assigned time slot is desirable.

4.1.4 Coordination With Other Facilities, Local Area Managers and Sector Controllers

One of the most essential components of the TMC role is coordinating developing situations with the appropriate personnel. As discussed in the previous section, coordination with approach control managers in the terminal is necessary to determine the current and planned airport configurations, rates and any runway delays. Further, coordination between TMCs in adjacent centers is required to determine the various configurations and VARs for the ESP applications.

Additionally, coordination for proposed departures with local tower personnel is required during certain periods. This also may require coordination with the Central Flow Control Facility in order to check for any Estimated Departure Clearance Times (EDCTs).

The other main component of TMC role is coordination with area managers and sector controllers in his/her own center. One of the main tools for coordinating ASP meter fix and outer fix assigned times with the sector controllers is the AD message to display sector lists. The format for this message is discussed in section 5.1.3.

In regards to sector metering lists, the TMC should be aware that when delay is displayed as a negative value this means the reverse of a delay situation. Specifically, negative delay represents a speedup situation. There are three ways in which a flight's delay may be negative:

1. A manual assignment has been made where the flight's projected VTA is later than the manually entered time slot.

2. A frozen flight has had VTA updates such that the VTA is later than the maintained frozen time slot.

3. Processing for the PTOL parameter.

It should be noted that when a flight has negative delay assigned and it is eligible for outer fix sector metering lists, that all of the speedup is reflected in the assigned outer fix time. The AMDT (Amount of Delay at Meter Fix) parameter only applies to flights where actual delays exist. The reader is referred to sections 6.1.2 and 6.2 for definitions and examples of ASP sector metering lists.

SECTION 5

INPUT MESSAGES

This section provides a detailed description of the following types of NAS input messages that a Traffic Management Coordinator can make and their effect on metering:

1. Arrival Display (AD) message
2. Change Parameter (CP) message
3. Examine Parameter (EP) message

In addition a brief description is provided of the following messages and their effect on metering:

1. Flight Plan (FP) message
2. Amendment (AM) message, other messages that amend flight plans
3. Departure (DM) message
4. Progress Report (PR) message
5. Remove Strip (RS) message
6. Hold (HM) message, messages that cancel a hold
7. Accept Handoff (QN) message
8. Resector (CS) message

5.1 ARRIVAL DISPLAY (AD) MESSAGES

The purpose of the AD message is to provide the TMC with a capability to manage the metering function from the PVD and its associated input devices. The following is a list of all the AD messages, which are discussed in detail in the sections listed:

			Section
1.	Request Metering Position List		5.1.1
2.	Suppress Metering Position List		5.1.2
3.	Request Sector Metering Lists		5.1.3
4.	Suppress Sector Metering Lists		5.1.4
5.	Change Vertex Acceptance Rate	(*MODIFIED*)	5.1.5
6.	Change Airport Configuration	(*MODIFIED*)	5.1.6
7.	Change Arrival Delay	(*MODIFIED*)	5.1.7
8.	Combine Metered Airports		5.1.8
9.	Decombine Metered Airports		5.1.9
10.	Manual Assign	(*MODIFIED*)	5.1.10
11.	Manual Delete		5.1.11
12.	Manual Swap	(*NEW*)	5.1.12

The one new AD message (Manual Swap) and the four AD messages whose entry formats have been modified are noted appropriately. Note that all AD messages except Request/Suppress Sector Metering Lists also apply to ESP. Changes for ESP are described as they apply to each individual message.

An AD message must be entered at an adapted metering position, as defined in adaptation record MPVD. The AD message is entered via either:

- the quick action Plan View Display (QP) key at the "R" position

- "QP" on the alphanumeric keyboard at the associated "D" position after selecting the "Other Messages" key

Each AD message is comprised of several fields, some of which are sometimes optional. For a message to be accepted, the following three conditions have to be met:

1. All entered fields are in the proper format.

2. The order of fields is correct for the particular message.

3. The desired action is allowable by metering.

Error messages will be returned if any of these conditions is not met for a particular message. Table 5-1 describes each field and its required format. The following sections on each message further describe the field formats as they apply to each message (under Where:), show the required order (under Fields:) and describe the additional conditions that pertain

to the message (under Restrictions:). All fields are required to be entered in the order shown. Optional fields are enclosed in parenthesis. Items in the bold type (i.e., **AD LAX ON**) show fields a TMC must manually enter for each message. Field contents in upper case must be entered exactly as shown. Field contents in lower case must be entered as specified in Table 5-1, and under the "Where" and "Restrictions" of each message.

The ASP or ESP airport identifier, Field 13, is used with all AD messages. However, if an ASP or ESP metering position list is currently being displayed on the metering PVD associated with the entering device, this field may be omitted for certain AD messages and the airport identifier of the metering position list will be implied. If there is no metering position list on the PVD associated with the entering device, or if it is desired to enter an AD message (with field 13 optional) for an airport other than the one displayed, field 13 is required.

Table 5-1

AD MESSAGE FIELDS

Field Number	Field Name	Field Contents	Examples	Comments
01	message type	AD		Required for all AD messages, must be entered as shown
02	flight identification	flight_id	TWA79 501	Aircraft Identification (AID) of 2 to 7 characters or Computer Identification (CID) of 3 numeric digits (or 2 numeric digits and 1 character). CID only for an active metered flight with a flight plan.
13	location identifier	mapt aapt eapt focal_mapt peripheral_apt	DFW	Required or implied for all AD messages and entered as 3 characters. 'mapt' and 'focal_mapt' must be an adapted ASP or ESP airport identifier as adapted in ASPMTR or ESPMTR records. 'aapt' must only be an ASP airport identifier. 'eapt' must only be an ESP airport identifier. 'peripheral_apt' must be a peripheral metering airport identifier adapted in the AIRCOM record.
68	fix	mfix	TRAKE IOC	Fix identification for a meter fix (2 to 5 alpha-numeric characters).
86	time	time	0000 2359 1207	time (4 numeric digits) entered in hours (00 to 23) and minutes (00-59). Leading zeros are required.

Table 5-1 (Concluded)

Field Number	Field Name	Field Contents	Examples	Comments
87	metering action indicator, configuration name	ON OFF config_name	 STL30	Multi-purpose field: configuration name is an adapted airport configuration name (2 to 7 alphanumeric characters)
88	metering vertex acceptance rate/ arrival delay	var delay	060	Always entered as 3 numeric digits, if 'var' range is from 001 to 255. For 'delay' the range is from 000 to 300. Leading zeros are required.
89	metering message purpose	VAR ADLY CON LST NST		This field must be entered as shown for the appropriate message.
93	vertex identification name	vertex	RWY24 TNP	An adapted vertex identification (2 to 5 alphanumeric characters).
98	manual assign tentative designator	T		This field must be entered as shown.

5.1.1 Request Metering Position List

Purpose:

Request display of a specific metering position list for an ASP airport or an ESP airport to be displayed on a specific metering PVD associated with the requesting device.

Fields:	01	13	87
Field contents:	**AD**	**mapt**	**ON**
Example:	**AD**	**LAX**	**ON**

Where:

mapt is an adapted ASP or ESP airport identifier.

Restrictions:

1. Only one metering position list can be displayed on a specific metering PVD at a time.

2. The requested airport must not have a metering position list currently displayed at another metering PVD.

3. No metering position list can currently be displayed on the requesting metering PVD; that is, an existing list must be suppressed before a new list can be displayed.

Results:

The appropriate ASP or ESP metering position list will be displayed on the metering PVD associated with the requesting device.

Related Parameters:

Parameters FCDI and CLLE determine when flights are eligible for display or deletion from metering position lists. Parameter ESAF (for ESP only) also determines which flights are eligible for an ESP metering position list.

5.1.2 Suppress Metering Position List

Purpose:

Suppress display of a specific metering position list for an ASP airport or an ESP airport that is currently displayed on a metering PVD.

Fields:	01	(13)	87
Field contents:	AD	mapt	OFF
Examples:	AD		OFF
	AD	JFK	OFF

Where:

mapt is an adapted ASP or ESP airport identifier.

Restrictions:

Field 13, if entered, must contain the airport identifier of an ASP/ESP metering position list currently displayed at a metering PVD. If Field 13 is omitted, the metering position list on the metering PVD associated with the requesting device will be suppressed.

Results:

The appropriate ASP or ESP metering position list will be deleted from the metering PVD where it is currently being displayed.

5.1.3 Request Sector Metering Lists

Purpose:

Request display of sector metering lists for a specific ASP airport.

Fields:	01	(13)	89
Field contents:	AD	aapt	LST
Examples:	AD		LST
	AD	SFO	LST

Where:

aapt is an adapted ASP airport identifier.

Restrictions:

Field 13, if entered, must contain the airport identifier of an ASP airport adapted in the ASPMTR record. If Field 13 is omitted, the metering position list on the metering PVD associated with the requesting device must be for an ASP airport.

Note:

Sector metering lists cannot be displayed for an ESP airport.

Results:

The appropriate sector metering lists will be displayed on sector PVDs which control the airspace containing the meter fixes and outer fixes adapted for the requested or implied ASP airport.

Related Parameters:

Parameters OFDI, FCLT, MLDI, AMDT and SLDI determine when flights are eligible for display or deletion in the sector lists and how delay is allocated between the meter fix and the outer fix. It is recommended that the desired values of these parameters, for the specific ASP airport, be set via CP messages prior to the entry of this AD message.

5.1.4 Suppress Sector Metering Lists

Purpose:

Suppress display of sector metering lists for a specific ASP airport.

Fields:	01	(13)	89
Field contents:	AD	aapt	NST
Examples:	AD		NST
	AD	MIA	NST

Where:

aapt is an adapted ASP airport identifier.

Restrictions:

Field 13, if entered, must contain the airport identifier of an ASP airport for which sector metering lists are currently displayed.

If Field 13 is omitted, the metering position list on the metering PVD associated with the requesting device must be for an ASP airport for which sector metering lists are currently displayed.

Results:

The appropriate sector metering lists for the requested or implied ASP airport will be deleted from all sector PVDs where they are currently being displayed.

5.1.5 Change Vertex Acceptance Rate (VAR) (*MODIFIED*)

Purpose:

Change the VAR for a specific vertex or for all vertices of a configuration for a specific ASP or ESP airport.

Fields:	01	(13)	(93)	89	88	(86)
Field contents:	**AD**	**mapt**	**vertex**	**VAR**	**var**	**time**
Examples:	**AD**			**VAR**	**060**	
	AD			**VAR**	**048**	**2145**
	AD		**RWY26**	**VAR**	**030**	
	AD		**TNP**	**VAR**	**024**	
	AD	**DEN**	**18IFR**	**VAR**	**020**	**1330**

Where:

mapt is an adapted ASP or ESP airport identifier.
vertex is an adapted ASP or ESP vertex identifier comprised of from 2 to 5 alphanumeric characters.
var is the desired vertex acceptance rate (flights per hour) entered as 3 numeric digits (001 to 255). Note that leading zeros are required.
time is the commence time at which the entered VAR is to take effect and is entered in hours (00 to 23) and minutes (00 to 59). Again, leading zeros are required.

Restrictions:

1. Field 93, if entered, must contain a vertex identifier that is defined for either the current or future configuration of the specified or implied ASP or ESP airport. This message will apply, if Field 93 is omitted, to all vertices of the appropriate configuration.

2. Field 86, if entered, and if Field 93 is entered, is the time at which the new VAR is to be applied and must contain a time for which the vertex is valid. The time cannot be after a configuration change is to take effect if the vertex is in the current configuration or cannot be before the configuration change is to take effect if the vertex is in the future configuration.
   This message will apply, if Field 86 is omitted as follows:
   a. If Field 93 is also omitted, the message will apply at the current time.
   b. If Field 93 is entered, the message will apply at the earliest time for the specified vertex. This time will be

the current time if the vertex is in the current configuration, or will be the effective time of the future configuration if the vertex is in the future configuration.

Notes:

1. Field 93 is a new field for this message. Field 89 was previously entered as 'AAR'; now it must be entered as 'VAR'.

2. A pending future VAR change will be voided for any vertex effected by processing of this message.

3. Only one future VAR may be pending, for each vertex in each configuration.

4. This message will cause the resequencing of the appropriate flights. Metering assigned times will change (ripple) for frozen, non-frozen and manually assigned flights. Thus, it is recommended to enter this message as far in advance as possible to minimize the impact, especially on the sector controllers.

5. A refresh of a vertex list (resequencing of appropriate flights) can be done by entering this message with field 88 equal to the existing VAR.

6. Field 93, the vertex identifier, is used to select a specific vertex of a multiple vertex configuration. It may be omitted if the configuration is a single vertex configuration or if the change is desired for all vertices in a multiple vertex configuration.

7. In most cases, only flights with a CLT (or CVT) later than the commence time, implied or entered in Field 86, will be resequenced. The exception is the case where a VAR change is pending for the vertex and a new VAR change is entered with a commence time later than the pending commence time. When the pending VAR change is voided in this case, flights with CLTs (or CVTs) later than the pending commence time, but earlier than the entered commence time, will also be resequenced.

Results:

All impacted flights will have their CLT (or CVT) adjusted appropriately. The delay will be recalculated and additionally, for ASP flights, the assigned outer fix time and meter fix time will be recalculated. These changes will be reflected in updates to the metering position list and sector metering lists as required. The metering position list header (or headers) will be updated to reflect the new VAR information.

5.1.6 Change Airport Configuration (*MODIFIED*)

Purpose:

Change the airport configuration for a specific ASP or ESP airport.

Fields:	01	(13)	89	87	(86)
Field contents:	AD	mapt	CON	config_name	time
Example:	AD		CON	LAXEAST	
	AD		CON	R18IFR	0130
	AD	MSP	CON	RWY12LR	0215

Where:

mapt is an adapted ASP or ESP airport identifier.
config_name is an adapted ASP or ESP configuration name comprised of from 2 to 7 alphanumeric characters.
time is the commence time at which the entered configuration change is to take effect and is entered in hours (00 to 23) and minutes (00 to 59). Note that leading zeros are required.

Restrictions:

1. Field 87 is required and must be a configuration name that is adapted for the specified or implied ASP or ESP airport.

2. Field 86, if entered, is the commence time at which the configuration is to take effect. If Field 86 is omitted, the change will take effect at the current time.

Notes:

1. Field 89 was previously entered as 'RWY'; now it must be entered as 'CON'.

2. A pending future configuration change will be voided by processing of this message.

3. This message will cause resequencing of the appropriate flights. Metering assigned times will change (ripple) for frozen, non-frozen and manually assigned flights. Thus, it is recommended to enter this message as far in advance as possible to minimize the impact, especially on the sector controllers.

4. A refresh of all flights sequenced for the configuration (resequencing of appropriate flights and deletion of down-arrow

flights) can be done by entering this message with field 87 equal to the existing configuration name.

5. In most cases, only flights with a CLT (or CVT) later than the commence time, implied or entered in Field 86, will be resequenced. The exception is the case where a configuration change is pending and a new configuration change is requested with a commence time later than the pending commence time. When the future configuration is voided in this case, flights with CLTs (or CVTs) later than the pending commence time but earlier than the entered commence time will also be resequenced.

6. All pending VAR or ADLY changes scheduled to commence after the commence time of the new configuration will be voided. An ADLY change with a start time prior to and an end time later than the commence time of the new configuration will result in:
   a. If the ADLY is in effect for the entire airport (a single vertex configuration or all vertices of a multiple vertex configuration), it will remain in effect its entire scheduled delay period.
   b. Otherwise (ADLY in effect for some but not all vertices in a multiple vertex configuration), the ADLY will be adjusted to end at the commence time of the new configuration.

Results:

All impacted flights will have their undelayed metering times recalculated as required (including VTA for the appropriate configuration) and will be resequenced resulting in recalculation of CLT (or CVT), delay, and for ASP their assigned outer fix and meter fix times. These changes will be reflected in updates to the metering position list and sector metering lists as required. The metering position list header (or headers) will be updated to reflect the new configuration information.

5.1.7 Change Arrival Delay (*MODIFIED*)

Purpose:

Specify an Arrival Delay (ADLY) for a specific vertex or all vertices of a configuration for a specific ASP or ESP airport. An arrival delay is a time period when the VAR is set to zero for the specified vertex (vertices).

Fields:	01	(13)	(93)	89	88	86
Field contents:	AD	mapt	vertex	ADLY	delay	time
Examples:	AD			ADLY	015	2200
	AD		RWY06	ADLY	010	0100
	AD	SLC		ADLY	030	0212
	AD	DTW	RWY17	ADLY	022	1748

Where:

mapt is an adapted ASP or ESP airport identifier.
vertex is an adapted ASP or ESP vertex identifier comprised of from 2 to 5 alphanumeric characters.
delay is the desired length of time in minutes that an ADLY will be applied and is entered as 3 numeric digits (from 000 to 300). Note that leading zeros are required.
time is the desired commence time at which the ADLY is to begin and is entered in hours (00 to 23) and minutes (00 to 59). Again, leading zeros are required.

Restrictions:

1. Field 93, if entered, must contain a vertex identifier that is defined for either the current or future configuration (based on the time entered in Field 86) of the specified or implied ASP or ESP airport. If the entire delay period (starting at the commence time and extending delay minutes) applies to the specified vertex, the ADLY will be processed as entered. However, if the end time applies to a different vertex (crosses into a future configuration), the ADLY period will end at the commence time of the future configuration.

2. If Field 93 is omitted, the ADLY will apply to the entire airport for the full duration requested. It will apply to all vertices in a multiple vertex configuration and can extend into a future configuration.

Notes:

1. Field 93 is a new field for this message.

2. A pending ADLY will be voided for any vertex effected by processing of this message.

3. Only one ADLY may be pending, for each vertex in each configuration.

4. This message will cause the resequencing of the appropriate flights. Metering assigned times will change (ripple) for frozen, non-frozen and manually assigned flights. Thus, it is recommended to enter this message as far in advance as possible to minimize the impact, especially on the sector controllers.

5. Field 93, the vertex identifier, is used to select a specific vertex of a multiple vertex configuration. It may be omitted if the configuration is a single vertex configuration or if the ADLY is desired for the entire airport (all vertices in a multiple vertex configuration).

6. In most cases, only flights with a CLT (or CVT) later than the commence time, implied or entered in Field 86, will be resequenced. The exception is the case where an ADLY is pending for the vertex and a new ADLY is entered with a commence time later than the pending commence time. When the pending ADLY is voided in this case, flights with CLTs (or CVTs) later than the pending commence time, but earlier than the entered commence time, will also be resequenced.

Results:

All impacted flights will be resequenced such that no CLTs (or CVTs) will be assigned during the ADLY period. The delay for each flight will be recalculated, and for ASP the assigned outer fix and meter fix times will be recalculated. These changes will be reflected in updates to the metering position list and sector metering lists as required. The metering position list header (or headers) will be updated to reflect the new ADLY information.

5.1.8 Combine Metered Airports

Purpose:

Specify peripheral ASP or ESP airports that are to be combined for metering with a specific focal ASP or ESP airport.

Fields:	01	13
Field contents:	AD	focal_mapt/peripheral_apt[+peripheral_apt]...
Examples:	AD	MIA/FLL
	AD	MIA/FLL+PBI

Where:

focal_mapt is an adapted ASP or ESP airport identifier (adapted in adaptation records ASPMTR or ESPMTR).

peripheral_apt is an adapted ASP or ESP airport identifier (adapted in adaptation record AIRCOM). Note up to 14 peripheral airports can be included to the right of the slash.

Restrictions:

1. Each peripheral metered airport must be a legal combination (as defined in adaptation) with the focal metered airport.

2. The peripheral metered airport cannot already be combined with any other metered airport other than the focal metered airport.

Notes:

1. After entry of this message it may take up to one minute to add all flights destined to peripheral metered airports to the focal metering position list because all flight plans must be checked for eligibility.

2. Flights destined to the peripheral airports will enter the list as newly eligible flights and cannot take a slot occupied by a frozen flight.

Results:

All flights destined to the peripheral metered airports will be processed as though they are destined to the focal metered airport. These changes will be reflected in updates to the metering position list and sector metering lists as required. The metering position list header will be updated to reflect the new airport combination status.

5.1.9 Decombine Metered Airports

Purpose:

Specify peripheral ASP or ESP airports that are to be decombined from a specific ASP or ESP focal airport with which they have previously been combined.

Fields:	01	13
Field contents:	AD	focal_mapt/focal_mapt
	AD	peripheral_apt/peripheral_apt
Examples:	AD	MIA/MIA
	AD	PBI/PBI

Where:

focal_mapt is an adapted ASP or ESP airport identifier (adapted in adaptation records ASPMTR or ESPMTR).
peripheral_apt is an adapted ASP or ESP airport identifier (adapted in adaptation record AIRCOM).

Restrictions:

1. The airport on the left of the slash must match the airport on the right of the slash.

2. The airport specified must be currently combined.

3. If the airport specified is a focal airport, all peripheral airports combined with that focal will be decombined.

Note:

This message will cause the deletion of the appropriate flights and subsequent resequencing of the remaining flights. Metering assigned times will change (ripple) for frozen, non-frozen and manually assigned flights. Thus, it is recommended to fully consider the impact of this message, especially on the sector controllers, prior to its use.

Results:

All flights destined to the specific peripheral airport or airports will be deleted from metering for the focal airport. These changes will be reflected in updates to the metering position list and sector metering lists as required. The metering position list header will be updated to reflect the new airport combination status.

5.1.10 Manual Assign (*MODIFIED*)

Purpose:

Manually assign a specific CLT or CVT to a specified flight in a specific ASP or ESP metering position list.

Fields:	01	(13)	(68 or 93)	86	(98)	02
Field contents:	AD	aapt	mfix	time	T	flight_id
	AD	eapt	vertex	time	T	flight_id
Examples:	AD			1311		AAL133
	AD			1227	T	DAL79
	AD		BDF	1049		SWA100
	AD		KEANN	0911	T	UAL119
	AD	ORD	VAINS	1917		MID121

Where:

aapt is an adapted ASP airport identifier
eapt is an adapted ESP airport identifier
mfix is an adapted ASP meter fix identifier (2 to 5 alphanumeric characters)
vertex is an adapted ESP vertex identifier (2 to 5 alphanumeric characters)
time is the desired CLT (or CVT) to assign to the flight and is entered in hours (00 to 23) and minutes (00 to 59). Leading zeros are required.
flight_id is an Aircraft Identification (AID) or a Computer Identification (CID)

Restrictions:

1. If field 68 is entered, the airport entered in field 13 or implied must be an ASP airport. Further, field 68 must contain an adapted ASP meter fix identifier valid for the configuration active at the time entered in field 86.

2. If field 93 is entered, the airport entered in field 13 or implied must be an ESP airport. Further, field 93 must contain an adapted ESP vertex identifier valid for the configuration active at the time entered in field 86.

3. Field 98 is required to assign a TCLT or TCVT (a non-frozen or tentative slot). If field 98 is omitted, an ACLT or ACVT will be assigned.

4. If the flight specified in field 02 is already in metering as a frozen flight (has an ACLT or ACVT), field 98 cannot be entered.

5. CID format for field 02 can only be used if the flight is already metered and has an active flight plan. It cannot be used for a 'down arrow' flight.

6. For an ASP airport, if:
   a. The flight in field 02 has no flight plan, then field 68 is required.
   b. The flight in field 02 is in metering and has been assigned a meter fix:
      - field 68 may be omitted.
      - if field 68 is entered, it must match the assigned meter fix.
   c. The flight in field 02 is in metering and is a NOFIX flight, then field 68 may not be entered.

7. For an ESP airport, if:
   a. The flight in field 02 has no flight plan, then field 93 is required if the slot time is in a multiple vertex configuration.
   b. The flight in field 02 has no flight plan and the slot time is in a single vertex configuration or if the flight is in metering and has been assigned a vertex, field 93 may be omitted. However, if entered, field 93 must match the active or assigned vertex.

Notes:

1. Fields 68, 93 and 98 are new fields for this message.

2. This message will cause the insertion of the specified flight into the sequence (and deletion of the flight from a slot if it was already sequenced) and the subsequent resequencing of some remaining flights. Metering assigned times may change for frozen, non-frozen and manually assigned flights. Thus, it is recommended to fully consider the impact of this message, especially on the sector controllers, prior to its use.

3. In most cases, only flights with a CLT (or CVT) later than the time entered in field 86 will be resequenced. The exception case is where a flight already sequenced is assigned a new time later than its currently assigned time. In this case, flights with CLTs (or CVTs) later than this currently assigned time will also be adjusted.

4. Since flights that are NOFIX (or NOVRTX) cannot be manually assigned to a meter fix (or ESP vertex), it is recommended that

these flights be examined and rerouted by an AM message if desired.

5. A flight will be assigned the first assignable CLT (or CVT) at or after the entered time. The difference between assigning a frozen time versus a non-frozen time is how subsequent resequencing of the entry occurs. For a frozen time (field 98 omitted), the flight will always be sequenced in the first assignable slot at or after the entered time. Ties with other manually assigned flights will be broken by priority. For a non-frozen time (field 98 entered), the flight will subsequently be resequenced based on its initial assigned priority.

6. This message is particularly useful in reserving a slot for a flight departing an airport internal to the center. If the AID of the departure is entered, it will automatically associate with the slot reserved for it after the flight departs.

Results:

The specified flight will be assigned the first assignable CLT (or CVT) at or after the entered time preserving the AAI in effect at that time for the vertex. Any ADLY in effect will also be honored. All impacted flights will be adjusted appropriately. The delay will be recalculated; for ASP flights, the assigned outer fix time and meter fix time will be recalculated. These changes will be reflected in updates to the metering position list and sector metering lists as required.

5.1.11 Manual Delete

Purpose:

Manually delete a specific flight from a specific ASP or ESP metering position list.

Fields:	01	(13)	02
Field contents:	AD	mapt	flight_id
Examples:	AD		702
	AD	SEA	NWA177

Where:

mapt is an adapted ASP or ESP airport identifier.
flight_id is an Aircraft Identification (AID) or a Computer Identification (CID).

Restrictions:

1. The flight must be in the metering position list for the specified or implied ASP or ESP airport.

2. CID format for field 02 can only be used if the flight has an active flight plan. It cannot be used for a 'down arrow' flight or a flight that does not have an active flight plan.

Notes:

1. This message will cause deletion of the specified flight and subsequent resequencing of some remaining flights. Metering assigned times may change for frozen, non-frozen and manually assigned flights. Thus, it is recommended to fully consider the impact of this message, especially on the sector controllers, prior to its use.

2. Only flights with a CLT (or CVT) later than the CLT (or CVT) of the deleted flight will be resequenced. Flights will typically move ahead one slot to fill the vacancy left by the deleted flight.

3. Once a flight has been manually deleted, it can only reenter metering via an AD manual assign message.

Results:

The specified flight will be deleted from the appropriate ASP or ESP metering position list and any sector metering lists as required. Updates to the times for other metered flights will be made and displayed as required.

5.1.12 Manual Swap (*NEW*)

Purpose:

Manually swap the assigned CLTs (or CVTs) for two specified flights in a specific ASP (or ESP) metering position list.

Fields:	01	(13)	02	02
Field contents:	AD	mapt	flight_id	flight_id
Examples:	AD		807	419
	AD	STL	TWA67	TWA119

Where:

mapt is an adapted ASP or ESP airport identifier.
flight_id is an Aircraft Identification (AID) or a Computer Identification (CID)

Restrictions:

1. Both flights must be in the metering position list for the specified or implied ASP or ESP airport.

2. A flight cannot be swapped with itself.

3. Neither flight can be a "down arrow flight."

4. For ASP, both flights must be assigned a meter fix. For ESP, both flights must be assigned a vertex.

5. If both flights are in the same configuration, then they must have the same vertex. If both flights are in different configurations, then for ASP they must have the same meter fix or for ESP they must have the same vertex.

6. The flight with the later CLT (CVT) must be able to make (based on its VTA) the earlier CLT (CVT) + PTOL (this restriction does not apply to a manually assigned flight).

7. CID format for field 02 can only be used if the flight has an active flight plan.

Notes:

1. If a frozen flight is swapped with a non-frozen flight, both flights will be frozen after the swap.

2. Two flights swapped by this message may be swapped back by the automatic swap logic if they are currently eligible or subsequently become eligible for automatic swap. Eligibility for an automatic swap is determined by parameter ASSR.

Results:

The two flights will be resequenced based on the swap of CLTs (or CVTs). The delay will be recalculated for each flight. For ASP, the assigned outer fix and meter fix times will be recalculated. These changes will be reflected in updates to metering position list and sector metering lists as required.

5.2 DYNAMIC PARAMETERS

Ten new dynamic parameters have been added to metering, bringing the total to nineteen parameters that affect metering. These parameters allow the TMC to adjust the metering function as situations change. These parameters are changed by entry of a CP message or examined by entry of an EP message at an appropriate KVDT.

The parameters may be grouped into the following four areas:

1. Switches: activate or deactivate processing

2. Eligibility and Sequencing

3. Sector Metering List: for ASP only

4. Times: control generation and application of time updates

The following is a list of all the dynamic parameters used for metering, which are discussed in detail in the sections listed. New parameters are also identified.

			Area	Section
1.	AMDT		Sector Lists	5.2.1
2.	ASSR	(*NEW*)	Eligibility and Sequencing	5.2.2
3.	CLLE		Eligibility and Sequencing	5.2.3
4.	ESAF	(*NEW*)	Eligibility and Sequencing	5.2.4
5.	FCDI		Times	5.2.5
6.	FCLT		Eligibility and Sequencing, Sector Lists	5.2.6
7.	FCPU	(*NEW*)	Times	5.2.7
8.	FTUI		Times	5.2.8
9.	MBCT	(*NEW*)	Times	5.2.9
10.	MDTS	(*NEW*)	Switch	5.2.10
11.	METR		Switch	5.2.11
12.	MLDI		Eligibility and Sequencing, Sector Lists	5.2.12
13.	MTUI	(*NEW*)	Times	5.2.13
14.	MTUT	(*NEW*)	Times	5.2.14
15.	OFDI		Sector Lists	5.2.15
16.	ORNG	(*NEW*)	Times	5.2.16
17.	PCTD	(*NEW*)	Eligibility and Sequencing	5.2.17
18.	PTOL	(*NEW*)	Eligibility and Sequencing	5.2.18
19.	SLDI		Sector Lists	5.2.19

The detailed discussion of each parameter follows the format used for AD messages in section 5.1.

5.2.1 AMDT - Amount of Delay Time

Purpose:

AMDT is used to calculate the assigned outer fix time and resulting delay at an outer fix when an outer fix is on the route of an ASP metered flight. AMDT is subtracted from the total delay for the flight with the result being the desired outer fix delay. The metering assigned time at the outer fix is obtained by adding the outer fix delay to the undelayed outer fix time.

Message formats:

```
EP  AMDT  aapt/mfix
CP  AMDT  aapt/mfix  value
```

Examples:

```
EP  AMDT  BOS/GLIMR
CP  AMDT  DEN/DRAKO  4
```

Where:

aapt is an adapted ASP airport identifier.
mfix is an adapted ASP meter fix identifier (2 to 5 alphanumeric characters).
value is the desired value of AMDT in minutes. Legal values are from 0 to 300 by 1 in units of minutes.

Restrictions:

mfix is a required field and must be a valid meter fix for the entered ASP airport.

Notes:

1. Setting AMDT to zero will result in the total delay being displayed in the outer fix list.

2. Changes to this parameter will apply to all outer fixes associated with the specified meter fix.

3. It is recommended that the desired value of this parameter, for the specific ASP airport, be set prior to enabling sector lists via an AD message.

Related Parameters:

FCLT, MLDI, OFDI, and SLDI also control sector lists.

5.2.2 ASSR - Automation Swap Slot Region (*NEW*)

Purpose:

ASSR is used to define a metering region where two non-frozen metered flights, destined to the same meter fix for ASP (or same vertex for ESP), may automatically swap CLTs (CVTs) to match the order of arrival projected by the two flights' VTAs. This region extends ASSR minutes prior to the freeze time (see parameters FCLT and MLDI) applicable for each flight.

Message formats:

```
EP  ASSR  mapt
CP  ASSR  mapt  value
```

Examples:

```
EP  ASSR  PHX
CP  ASSR  ATL   4
```

Where:

mapt is an adapted ASP or ESP airport identifier.
value is the desired value of ASSR in minutes. Legal values are from 0 to 30 by 1 in units of minutes.

Notes:

1. Setting ASSR to zero will disable the automatic swap slot process for the specified airport.

2. The manual swap AD message can be used to swap flights if automatic swap has been disabled or to swap certain flights not eligible for automatic swap. See section 5.1.12 on manual swap for more details.

3. Manually assigned flights are not eligible to be automatically swapped.

Related Parameters:

FCDI, PCTD, FCLT, MLDI, and CLLE all apply to the definition of metering regions. PTOL is used as a criteria for swapping.

5.2.3 CLLE - Calculated Landing List Eligibility

Purpose:

CLLE is the number of minutes prior to a flight's CLT (or CVT) that the flight will be removed from metering and deleted from all metering displays.

Message formats:	EP	CLLE	mapt	
	CP	CLLE	mapt	value
Examples:	EP	CLLE	CLT	
	CP	CLLE	BNA	6

Where:

mapt is an adapted ASP or ESP airport identifier.
value is the desired value of CLLE in minutes. Legal values are from 0 to 20 by 1 in units of minutes.

Notes:

1. Setting CLLE to zero will cause flights to remain in metering until their CLT or CVT. However, flights will usually become 'down arrow flights' prior to this because NAS will automatically drop the flight (the flight is in terminal airspace for ASP or the adjacent center for ESP).

2. CLLE is not retroactive; that is, setting CLLE to a smaller value will not cause flights previously dropped to reenter metering.

3. Changes to this parameter should rarely be required.

Related Parameters:

FCDI and ESAF also determine metering eligibility.

5.2.4 ESAF - En Route Spacing Altitude Filter (*NEW*)

Purpose:

ESAF defines an assigned altitude eligibility filter for ESP. Flights must have an assigned altitude greater than or equal to ESAF to be eligible for further ESP processing.

Message formats:	EP	ESAF	eapt	
	CP	ESAF	eapt	value
Examples:	EP	ESAF	JAX	
	CP	ESAF	LGA	240

Where:

eapt is an adapted ESP airport identifier.
value is the desired minimum altitude that is eligible in hundreds of feet. Legal values are from 0 to 990 by 1 in units of hundreds of feet.

Restrictions:

This parameter only applies to an ESP airport.

Notes:

1. Setting ESAF to zero will disable this filter and allow all flights to be eligible for further ESP processing.

2. ESAF is retroactive; that is, after a change is made to ESAF one of the following takes place:
   a. If the new value of ESAF is lower than the old value, flights not previously eligible will be rechecked to determine if they are now eligible. This process can take up to one minute.
   b. If the new value of ESAF is higher than the old value, any impacted metered flights will be deleted from metering.

Related Parameters:

FCDI and CLLE also determine ESP eligibility.

5.2.5 FCDI - Flow Control Display Interval

Purpose:

FCDI is used to determine metering eligibility. For ASP, a flight is eligible when it is within FCDI minutes of its CTA at the destination ASP airport. For ESP, a flight is eligible when it is within FCDI minutes of its CTA at its center boundary exit point.

Message formats:	EP	FCDI	mapt	
	CP	FCDI	mapt	value
Examples:	EP	FCDI	HOU	
	CP	FCDI	MEM	90

Where:

mapt is an adapted ASP or ESP airport identifier.
value is the desired value of FCDI in minutes. Legal values are from 0 to 200 by 1 in units of minutes.

Notes:

1. Setting FCDI to zero will disable automatic entry of flights into metering for the specified airport.

2. FCDI is not retroactive; that is, setting FCDI to a smaller value will not cause flights in metering to be deleted from metering.

3. Changes to this parameter should rarely be required.

Related Parameters:

CLLE and ESAF also determine metering eligibility.

5.2.6 FCLT - Freeze Calculated Landing Time

Purpose:

FCLT is used to determine when a flight becomes frozen (its TCLT becomes an ACLT for an ASP flight or a TCVT becomes an ACVT for an ESP flight). For ASP a flight is frozen FCLT minutes prior to its CTA at the meter fix. (FCLT is used for flights with a filed TAS greater than parameter Freeze Speed Threshold (FSPD). See also parameter MLDI.) For ESP a flight is frozen FCLT minutes prior to its metering calculated VTA.

Additionally, if ASP sector metering lists are enabled, the flight will also be eligible for display in a meter fix sector metering list at FCLT minutes prior to its CTA at the meter fix.

Message formats:	EP	FCLT	aapt/mfix	
	EP	FCLT	eapt/vertex	
	CP	FCLT	aapt(/mfix)	value
	CP	FCLT	eapt(/vertex)	value
Examples:	EP	FCLT	BAL/SWANN	
	EP	FCLT	MIA/LAL	
	CP	FCLT	MSY	13
	CP	FCLT	SAN/RZS	20

Where:

aapt is an adapted ASP airport identifier.
eapt is an adapted ESP airport identifier.
mfix is an adapted ASP meter fix identifier (2 to 5 alphanumeric characters).
vertex is an adapted ESP vertex identifier (2 to 5 alphanumeric characters).
value is the desired value of FCLT in minutes. Legal values are from 0 to 120 by 1 in units of minutes.

Restrictions:

If only the airport field is specified, the message will apply to all meter fixes or vertices of the airport. If a meter fix or vertex is specified, it must be valid for the specified airport. The resulting message will apply, in this case, to only the specified meter fix or vertex.

Notes:

1. It is recommended that the desired value of this parameter, for the specific ASP airport, be set prior to enabling sector lists via an AD message.

2. Since for ASP this parameter controls two events, freeze and eligibility for meter fix lists, a compromise must be made when selecting a value.

3. FCLT is retroactive; that is if FCLT is changed to a smaller value frozen flights will be rechecked to determine if they should be 'unfrozen'.

Related Parameters:

AMDT, MLDI, OFDI, and SLDI are also used with sector lists. FCDI, PCTD, ASSR, MLDI and CLLE all apply to the definition of metering regions.

5.2.7 FCPU - Free Track Calculated VTA Percentage Update (*NEW*)

Purpose:

FCPU determines what percentage of a time update calculated from the use of tracking data (see parameter ORNG) will be applied to the VTA of an ASP or ESP metered flight that is in FREE track status.

Message formats: EP FCPU

CP FCPU value

Examples: CP FCPU 5

Where:

value is the desired percentage (in 10 percent increments) that FCPU will be set to. Legal values are from 0 to 10 by 1 in units of 10 percent. Thus, for the example above, a value of 5 represents 50 percent.

Notes:

1. This parameter applies to time updates for metered flights generated by metering's use of tracking data.

2. Changes to this parameter should rarely be required.

Related Parameters:

ORNG, MTUI and MTUT are dynamic parameters that apply to the use of tracking data for generating metering time updates.

5.2.8 FTUI - Flow Time Update Interval

Purpose:

FTUI represents the minimum value of a time update generated by Flight Data Processing (FDP) that will be applied to a flight's metering calculated VTA.

Message formats:	EP	FTUI	
	CP	FTUI	value
Examples:	CP	FTUI	5

Where:

value is the desired value of FTUI in tenths of minutes. Legal values are from 1 to 300 by 1 in units of tenths of minutes. Thus, for the example above, 5 represents 0.5 minutes.

Notes:

1. This parameter applies to time updates for metered flights not subjected to time updates generated by metering's use of tracking data (see parameter ORNG).

2. Changes to this parameter should rarely be required.

5.2.9 MBCT - Metering Boundary Crossing Time (*NEW*)

Purpose:

MBCT specifies the time used to calculate when a flight plan will be transmitted to an adjacent center when the flight is destined to an adapted external metering airport. MBCT is used only when it is greater than the applicable ABCT parameter.

Message formats:	EP	MBCT	xapt	
	CP	MBCT	xapt	value
Examples:	EP	MBCT	TPA	
	CP	MBCT	EWR	45

Where:

xapt is an adapted external metered airport identifier (adapted in record EXMAPT).
value is the desired value of MBCT in minutes. Legal values are from 5 to 90 by 1 in units of minutes.

Restrictions:

The specified airport must be adapted as an external metered airport.

Notes:

1. This parameter is designed to benefit the receiving center by allowing earlier receipt of flight plans destined to a metered airport. Coordination with the adjacent center is recommended prior to changing this parameter.

2. MBCT is not retroactive; that is, once a flight plan has been transmitted to an adjacent cneter it cannot be recalled.

3. Changes to this parameter should rarely be required.

5.2.10 MDTS - Metering Data Transmission Switch (*NEW*)

Purpose:

MDTS is a switch that enables or disables the transmission of metering position list data from the Host Computer System to the Traffic Management Workstation (TMW).

Message formats:	EP	MDTS		
	CP	MDTS	(mapt)(/mapt)...	ON
	CP	MDTS	(mapt)(/mapt)...	OFF
Examples:	EP	MDTS		
	CP	MDTS	PIT/CLE/DTW	ON

Where:

mapt is an adapted ASP or ESP airport identifier (up to 5 airports per message).

Restrictions:

1. The interface to the TMW must exist and be defined in adaptation for this message to be successfully processed.

2. If no airports are entered, all metered airports are assumed and processing will be done accordingly.

3. Metering must be active (METR is ON) for transmission to occur.

Notes:

1. It is recommended to enable transmission when the number of flights in the metering position list is low to avoid possible overload of the interface. If that is not practical, airports should be enabled individually or in small groups to minimize the impact on the interface.

2. Transmission of metering position list data is controlled by this switch parameter and is independent of the display of metering position lists on metering PVDs.

3. If the metering data on the TMW becomes corrupted, recovery can be accomplished by toggling MDTS (turn off, then turn on). This will result in the transmission of a complete list of data for all airports or the requested airports.

5.2.11 METR - Metering Activation Switch

Purpose:

METR is a switch that enables or disables all metering processing. METR applies to both ASP and ESP airports adapted within the center.

Message formats:

```
EP METR
CP METR ON
CP METR OFF
```

Notes:

1. This message applies to all ASP and ESP metered airports adapted for the center. It does not apply to transmission of data to adjacent centers (FPs and AM messages) to airports adapted in the EXMAPT record.

2. If METR is set to OFF, all metering processing will stop within the center. Metering position lists and sector lists will be deleted from all displays. All manually assigned times will be lost. Thus, it is recommended to fully consider the impact of this message prior to its use.

3. After initial enabling of metering processing via this parameter, subsequent use of this message should be rarely required.

5.2.12 MLDI - Meter List Display Interval

Purpose:

MLDI is used to determine when an ASP flight becomes frozen if its filed TAS is less than parameter FSPD. (See also parameter FCLT.) An appropriate flight will be frozen MLDI minutes prior to its CTA at the meter fix. If ASP sector metering lists are enabled, the flight will also be eligible for display in a meter fix sector metering list at MLDI minutes prior to its CTA at the meter fix.

Message formats:	EP	MLDI	aapt/mfix	
	CP	MLDI	aapt(/mfix)	value
Examples:	EP	MLDI	DFW/BUJ	
	CP	MLDI	PHL	12

Where:

aapt is an adapted ASP airport identifier.
mfix is an adapted ASP meter fix identifier (2 to 5 alphanumeric characters).
value is the desired value of MLDI in minutes. Legal values are from 0 to 120 by 1 in units of minutes.

Restrictions:

If only the airport field is specified, the message will apply to all meter fixes of the airport. If a meter fix is specified, it must be valid for the specified airport. The resulting message will apply, in this case, to only the specified meter fix.

Notes:

1. It is recommended that the desired value of this parameter, for the specific ASP airport, be set prior to enabling sector lists via an AD message.

2. Since for ASP this parameter controls two events, freeze and eligibility for meter fix list, a compromise must be made when selecting a value.

3. MLDI is retroactive like FCLT (see section 5.2.6).

Related Parameters:

AMDT, FCLT, OFDI, and SLDI are also used with sector lists. FCDI, PCTD, ASSR, FCLT and CLLE all apply to the definition of metering regions.

5.2.13 MTUI - Metering Time Update Interval (*NEW*)

Purpose:

MTUI determines how frequently tracking data will be used to estimate metering VTAs. MTUI applies to only those metered flights eligible for tracking data calculations (see parameter ORNG).

Message format: EP MTUI

CP MTUI value

Example: CP MTUI 5

Where:

value is the desired value of MTUI in tenths of minutes. Legal values are from 0 to 20 by 1 in units of tenths of minutes. Thus, for the example above, 5 represents 0.5 minutes.

Note:

Changes to this parameter should rarely be required.

Related Parameters:

ORNG, FCPU, and MTUT also apply to the use of tracking data for generating metering time updates.

5.2.14 MTUT - Metering Time Update Threshold (*NEW*)

Purpose:

MTUT represents the minimum value of a time update generated by use of tracking data that will be applied to a flight's metering calculated VTA.

Message formats: **EP MTUT**

CP MTUT value

Example: **CP MTUT 5**

Where:

value is the desired value of MTUT in tenths of minutes. Legal values are from 0 to 20 by 1 in units of tenths of minutes. Thus, for the example above, 5 represents 0.5 minutes.

Note:

Changes to this parameter should rarely be required.

Related Parameters:

ORNG, FCPU, and MTUI also apply to the use of tracking data for generating metering time updates.

5.2.15 OFDI - Outer Fix Display Interval

Purpose:

If ASP sector metering lists are enabled, the flight will be eligible for display in an outer fix sector metering list, if the flight has an outer fix, at OFDI minutes prior to its CTA at the outer fix.

Message formats:	EP	aapt/mfix/ofix	
	CP	aapt(/mfix)(/ofix)	value
Examples:	EP	PHL/HAR	
	CP	IAH/TNV	14
	CP	DEN/IOC/HGO	12

Where:

aapt is an adapted ASP airport identifier.
mfix is an adapted ASP meter fix identifier (2 to 5 alphanumeric characters).
ofix is an adapted ASP outer fix identifier (2 to 12 alphanumeric characters).
value is the desired value of OFDI in minutes. Legal values are from 0 to 30 by 1 in units of minutes.

Restrictions:

If only the airport field is specified, the message will apply to all outer fixes of the airport. If a meter fix is specified, the message will apply to all outer fixes associated with the specified meter fix. If the outer fix is specified (meter fix is also required), the message will apply only to the specified outer fix for the specified meter fix. Meter fixes and outer fixes, when specified, must be valid for the specified airport.

Note:

It is recommended that the desired value of this parameter, for the specific ASP airport, be set prior to enabling sector lists via an AD message.

Related Parameters:

AMDT, FCLT, MLDI and SLDI also control sector lists.

5.2.16 ORNG - Outer Ring (*NEW*)

Purpose:

ORNG specifies the distance in nautical miles from the meter fix at which a flight may become eligible for the use of tracking data to calculate updates to the flights metering calculated VTA.

Message formats:	EP	ORNG	aapt/mfix	
	EP	ORNG	eapt/vertex	
	CP	ORNG	aapt(/mfix)	value
	CP	ORNG	eapt(/vertex)	value
Examples:	EP	ORNG	LAX/TNP	
	CP	ORNG	DAL/SCY	120
	CP	ORNG	ORD/BDF	150

Where:

aapt is an adapted ASP airport identifier.
eapt is an adapted ESP airport identifier.
mfix is an adapted ASP meter fix identifier (2 to 5 alphanumeric characters).
vertex is an adapted ESP vertex identifier (2 to 5 characters).
value is the desired value of ORNG in nautical miles. Legal values are from 0 to 500 by 1 in units of nautical miles.

Restrictions:

If only the airport field is specified, the message will apply to all meter fixes or vertices of the airport. If a meter fix or vertex is specified, it must be valid for the specified airport. The resulting message will apply, in this case, to only the specified meter fix or vertex.

Notes:

1. Setting ORNG to zero will disable the use of tracking data to calculate updates for the specified airport.

2. Changes to this parameter may result in updates to metered flight VTAs which can subsequently cause the metering list to ripple. The impact on sector controllers should be considered prior to making changes to this parameter.

Related Parameters:

FCPU, MTUI and MTUT also apply to the use of tracking data for generating metering time updates.

5.2.17 PCTD - Priority Control Time Determination (*NEW*)

Purpose:

PCTD is used to calculate when a flight is in a metering region where its priority is established and is subsequently not affected by further updates. PCTD is multiplied by FCDI to calculate the Priority Time Interval (PTI).

Message formats:	EP	PCTD	mapt	
	CP	PCTD	mapt	value
Examples:	EP	PCTD	LAS	
	CP	PCTD	DCA	75

Where:

mapt is an adapted ASP or ESP airport identifier.
value is the desired value of PCTD in percent. Legal values are from 0 to 100 by 5 in units of percents. Thus, in the example above, 75 represents 75 percent.

Note:

Setting PCTD to zero will disable the use of priority. Thus, non-frozen flights will be sequenced in order of their VTA and updates to a VTA can cause the metering list to ripple. The impact on the sector controllers should be considered prior to setting PCTD to zero.

Related Parameters:

ASSR, FCDI, FCLT, MLDI and CLLE all apply to the definition of metering regions.

5.2.18 PTOL - Priority Tolerance (*NEW*)

Purpose:

PTOL is used to determine which slot a flight can be assigned to (or is in competition for) and when a flight will lose a slot it currently occupies. A flight may be assigned a slot up to PTOL minutes ahead of its VTA. A non-frozen flight will lose its slot if it is late by greater than PTOL minutes.

Message formats:	EP	PTOL	mapt	
	CP	PTOL	mapt	value
Examples:	EP	PTOL	MCI	
	CP	PTOL	IAD	12

Where:

mapt is an adapted ASP or ESP airport identifier.
value is the desired value of PTOL in tenths of minutes. Legal values are from 0 to 30 by 1 in units of tenths of minutes. Thus, in the example above, 12 represents 1.2 minutes.

Notes:

1. Setting PTOL to zero will disable the tolerance check used in slot assignment.

2. Setting PTOL to a non-zero value may cause some flights to receive "negative delay." This occurs when they are late by less than PTOL and represents the amount of time to be made up to meet the metering assigned time.

Related Parameters:

ASSR determines when flights are eligible for automatic swapping of their slots. PTOL is used as a criteria by both automatic swap and manual swap processing.

5.2.19 SLDI - Sector List Drop Interval

Purpose:

SLDI is the number of minutes after an assigned meter fix time or outer fix time that a sector list entry will be automatically deleted from its sector list.

Message formats:	EP	SLDI	aapt	
	CP	SLDI	aapt	value
Examples:	EP	SLDI	MCO	
	CP	SLDI	RDU	5

Where:

aapt is an adapted ASP airport identifier.
value is the desired value of SLDI in minutes. Legal values are from 0 to 30 by 1 in units of minutes.

Notes:

1. It is recommended that the desired value of this parameter, for the specific ASP airport, be set prior to enabling sector lists via an AD message.

2. Sector controllers may also manually delete entries from their sector list.

3. Changes to this parameter should rarely be required.

Related Parameters:

AMDT, FCLT, MLDI and OFDI also control sector lists.

5.3 OTHER NAS MESSAGES

This section contains a brief description of the effect of eight other NAS messages on metering. Details of the messages and message format are not provided within this document. It is assumed that the reader is familiar with all of these messages.

5.3.1 Flight Plan (FP) Message

All flights in the NAS FDP database will periodically be checked for eligibility for metering. The FP message adds a new flight to the FDP database. Only flights with an active FP status are eligible for automatic entry into metering.

5.3.2 Amendment (AM) Message

Entry of the AM message, or other messages that result in a flight plan amendment (such as a Quick Action Route - QU), can impact metering in one of two ways. First, if the flight is currently not eligible for metering and one of the following types of amendment is entered:

1. destination of route field changed to a metered airport, or

2. altitude changed to higher than ESAF for a flight destined to an ESP airport,

the flight will subsequently enter metering if it meets all other eligibility checks the next time it is processed.

Second, if the flight is currently in metering, several things can result, based on the type of amendment. See figure 5-1 for details on AM message results. Figure 5-1(a) shows the results of an amendment for a flight not in metering or for a field 02, 03, 05, 07, or 08 amendment. Figure 5-1(b) shows the results of a field 10 amendment with a destination change. Figures 5-1(c) and 5-1(d) show the results of field 10 amendments for flights in ASP and ESP, respectively.

5.3.3 Departure (DM) Message

A DM message will change the status of the flight from a proposed to an active flight. It may now be eligible for automatic entry into metering if it meets the other eligibility criteria. If the flight was manually assigned a slot while it was still a proposal, it will now associate with that slot.

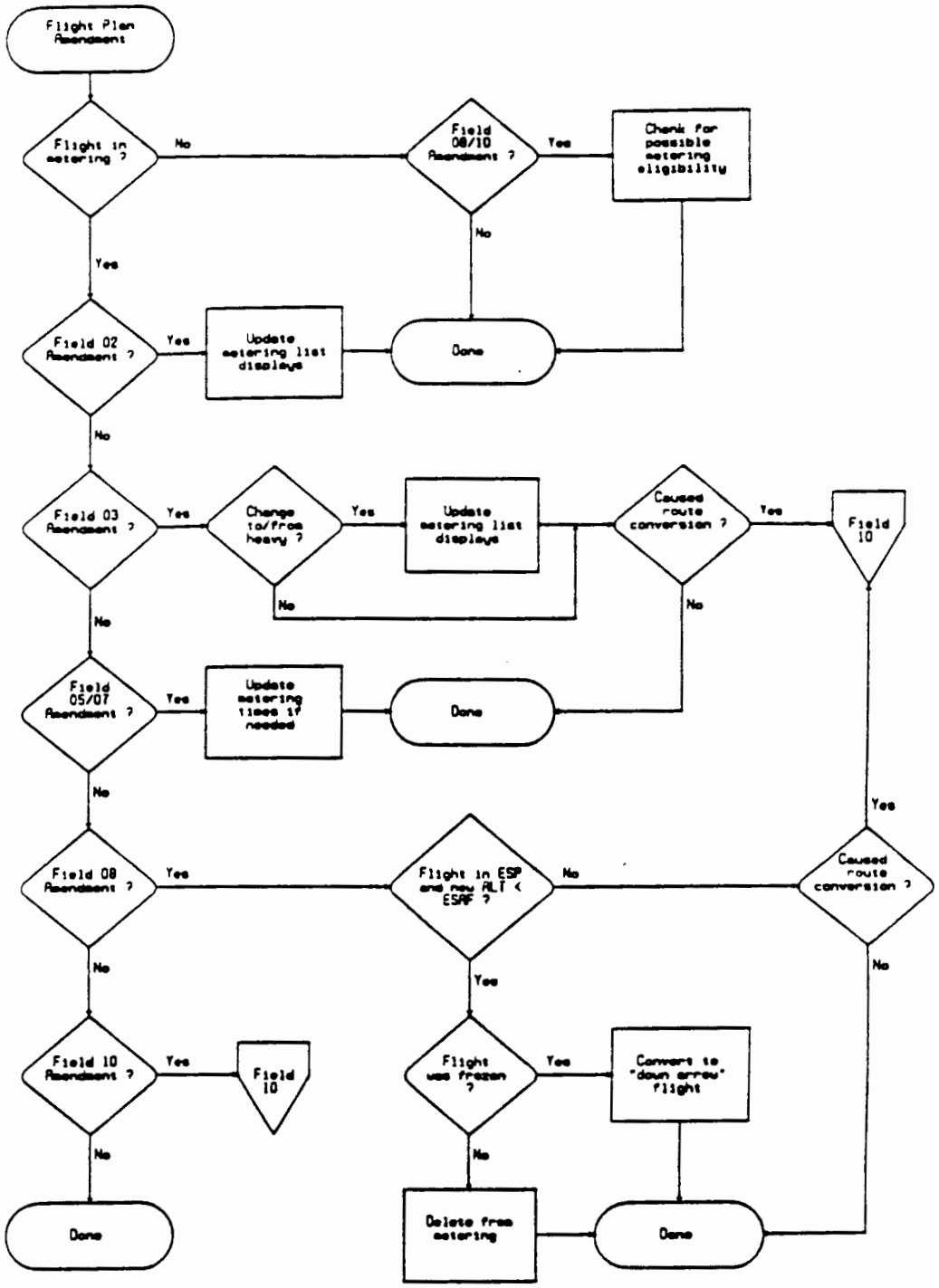

Figure 5-1 (a). AM Message Processing

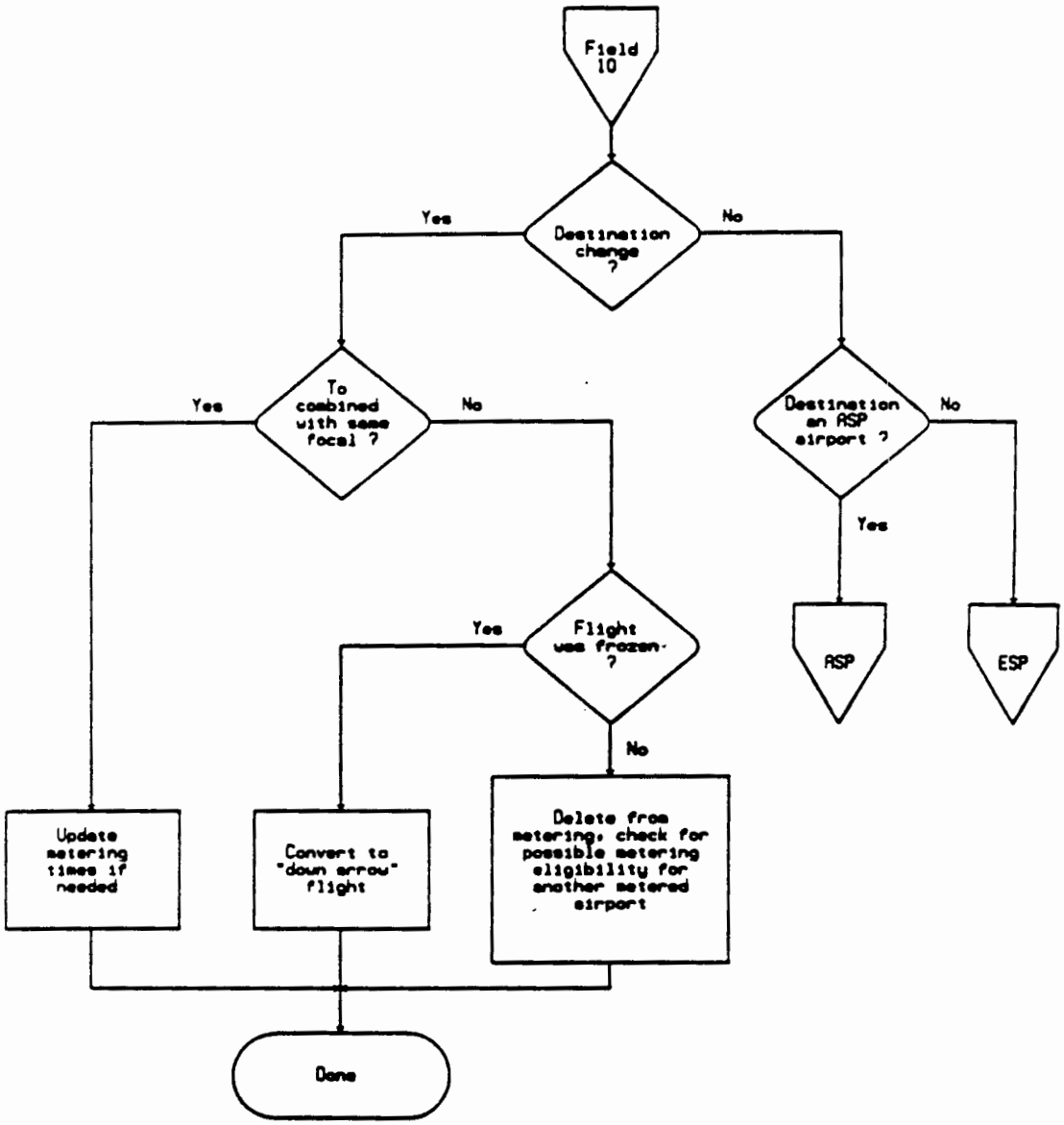

Figure 5-1 (b). Field 10 Processing

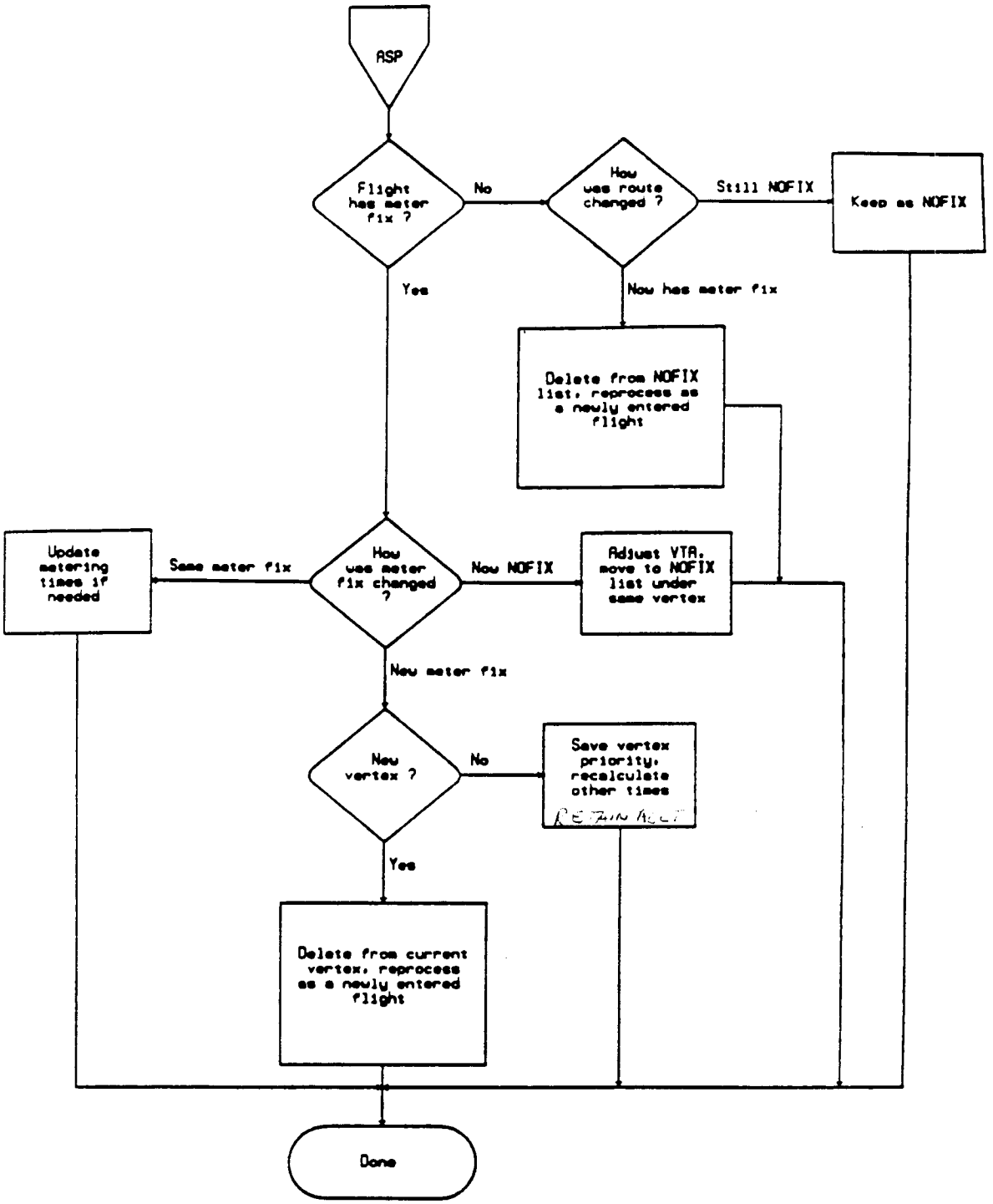

Figure 5-1 (c). ASP Processing

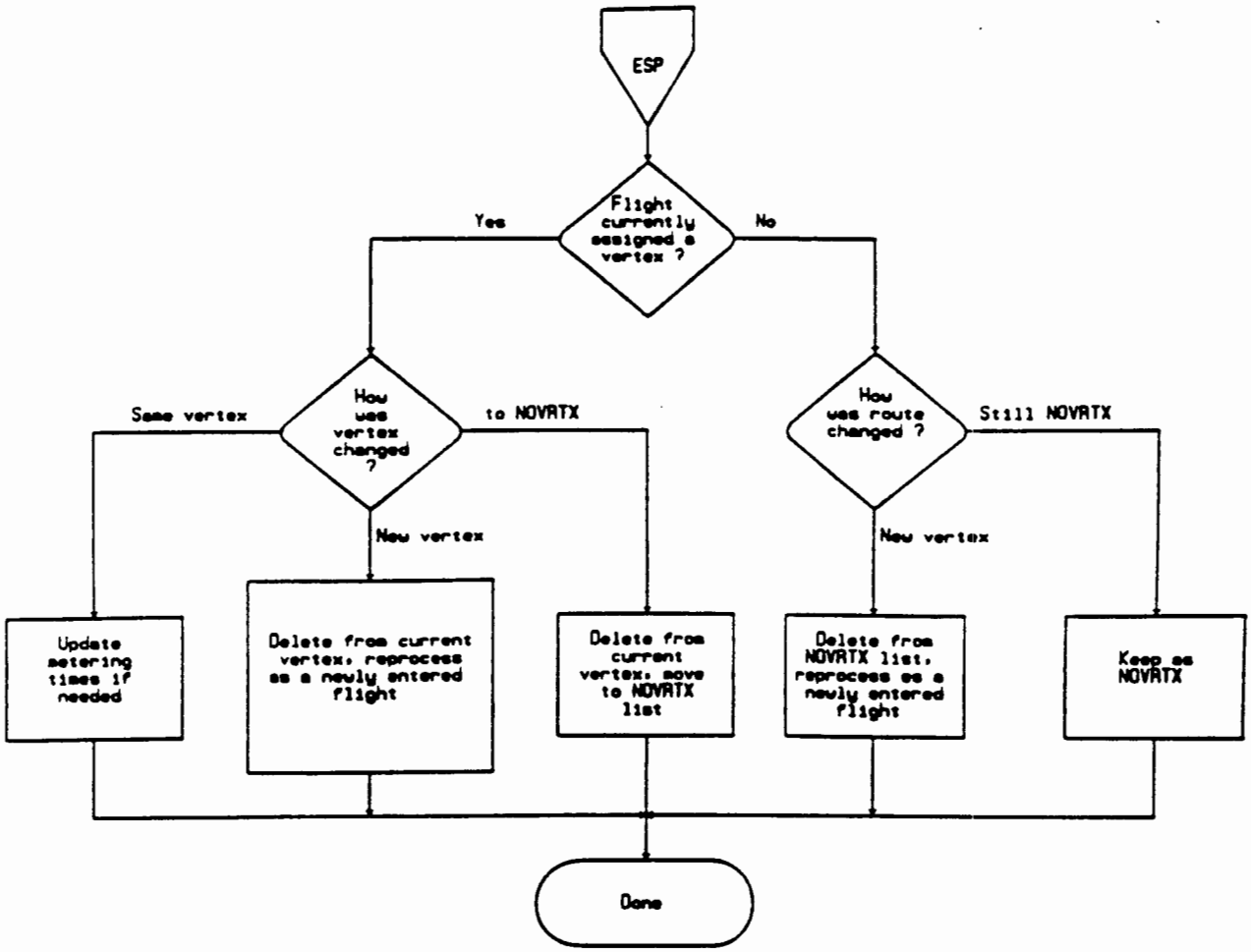

Figure 5-1 (d). ESP Processing

5.3.4 Progress Report (PR) Message

A PR message entered for a metered flight will cause its VTA to be updated if the magnitude of the progress report is greater than PTUI minutes and the flight is not eligible for metering time updates using tracking data. An update will cause recalculation of the flight's total delay, and for ASP, the outer fix delay. The metering position list and sector metering lists will be updated as appropriate.

5.3.5 Remove Strip (RS) Message

An RS message entered for a metered flight will result in one of the following actions:

1. For a non-frozen flight, the flight is removed from metering and all appropriate displays.

2. For a frozen flight, the flight becomes a 'down arrow flight' on the metering position list. It will be removed from any sector metering lists as appropriate.

5.3.6 Hold (HM) Message

An HM message entered for a metered flight will result in the symbol "H" being displayed to the left of the flight AID in any metering position list or sector metering list displaying the flight. A flight in hold and also subject to time updates from tracking data will have its VTA updated by one minute for every minute the flight remains in hold status.

When a hold is canceled the "H" will be removed from any metering position list or sector metering list displaying the flight.

5.3.7 Accept Handoff (QN) Message

A QN message entered for an ESP metered flight will result in the location indicator ("LOC" field) on the ESP metering position list to be updated to reflect the new controlling sector.

5.3.8 Resector (CS) Message

A CS message entered may change metering displays in one of the following ways:

1. For ASP, sector metering lists will be routed appropriately if sectors containing a meter fix or outer fix are either combined or decombined.

2. For ESP, the metering position list exit sector field for each flight will be modified if exit sectors are either combined or decombined.

SECTION 6

METERING OUTPUT DISPLAYS

This section describes the ASP and ESP metering position lists that a TMC can view on a metering PVD. Also described are the ASP sector metering lists that may be activated by the TMC. When activated, the ASP sector metering lists are displayed on the PVD of the radar controller position containing the adapted meter and outer fixes. There is no capability to display ESP sector metering lists. In summary, the types of metering lists provided are:

- ASP Metering Position Lists
- ESP Metering Position Lists
- ASP Sector Metering Lists

6.1 ASP METERING POSITION LIST

An ASP metering position list contains arrival information for metered flights destined to a metered airport and to any peripheral airports currently combined. Illustrated in figures 6-1, 6-2 and 6-3 are typical ways in which the arrival information is formatted and displayed.

Figure 6-1 shows the case of where a single vertex airport configuration is in effect. This metering list format is similar to the ERM-1A format, with the exception that the Delay Column, DLY, has been added. In ASP single vertex configurations, NOFIX flights are sequenced based on the NAS Calculated Time of Arrival (CTA) at the airport. This is similar to the ERM-1A processing of NOFIX flights.

Figure 6-2 illustrates the case of a multiple vertex airport configuration. Here, note that each vertex is grouped with flights subgrouped according to each flights' projected meter fix. Active flights not having an adapted meter fix in the filed flight plan are displayed as NOFIX flights and are not sequenced over any vertex. The one exception is where NOFIX flights have been previously manually assigned over a meter fix prior to becoming an active flight. In this case, the NOFIX flight remains sequenced at the manually assigned vertex and is listed as NOFIX at that vertex.

AIRPORT HEADER INFO

ACY-SVCON RWY1 VAR 30

VERTEX ID

RWY1

METER FIXES

	AID/CID	MFT	OFN	OFT	VTA	TCLT	DLY
MFIX1	TWA99 455	1035	OFIX1A	1025	1051	1050	-1
	LA33 017	1031	OFIX1B	1020	1044	1046	2
	NW123 216	1029	OFIX1A	1019	1043	1044	1
MFIX2	EA400 300	1027		1012	1043	1042	-1
	H+TWA34 200	1023	OFIX2A	1011	1032	1038	6
	M10987 100	1021	OFIX2A	1009	1031	1036	5
	NJS48 110	1019	OFIX3A	1006	1030	1034	4
	◇NTA4J					1032	
MFIX3	TW45J 109	1002	OFIX3A	0949	1028	1030	2
	N1P82 202	1008		0953	1027	1028	1
	+TWA42 209	1011	OFIX3A	0958	1026	1026	
	◇MID598 208	1004		0949	1025	1024	-1
MFIX4	TIN8J 414	0959	OFIX4A	0944	1017	1019	2
	BJ590 303	0957	OFIX4B	0942	1016	1017	1
NOFIX	EA97J 402				1016	1015	-1
	VA550 409				1010	1012	2
	M1P230 304				1009	1010	1

VERTEX ID

RWY1

AID/CID	MFN	MFT	OFN	OFT	VTA	ACLT	DLY
UAL20 139	MFIX1	0953	OFIX1A	0943	1008	1008	
MID87 152	MFIX2	0952	OFIX1B	0941	1007	1006	-1
↓TWA59						1004	
↓EA257						1002	
MID777 109	MFIX2	0945	OFIX2A	0933	0958	1000	2
TW943 088	MFIX3	0938	OFIX2B	0925	0957	0958	1

Figure 6-1. ASP Metering Position List Single Vertex Example

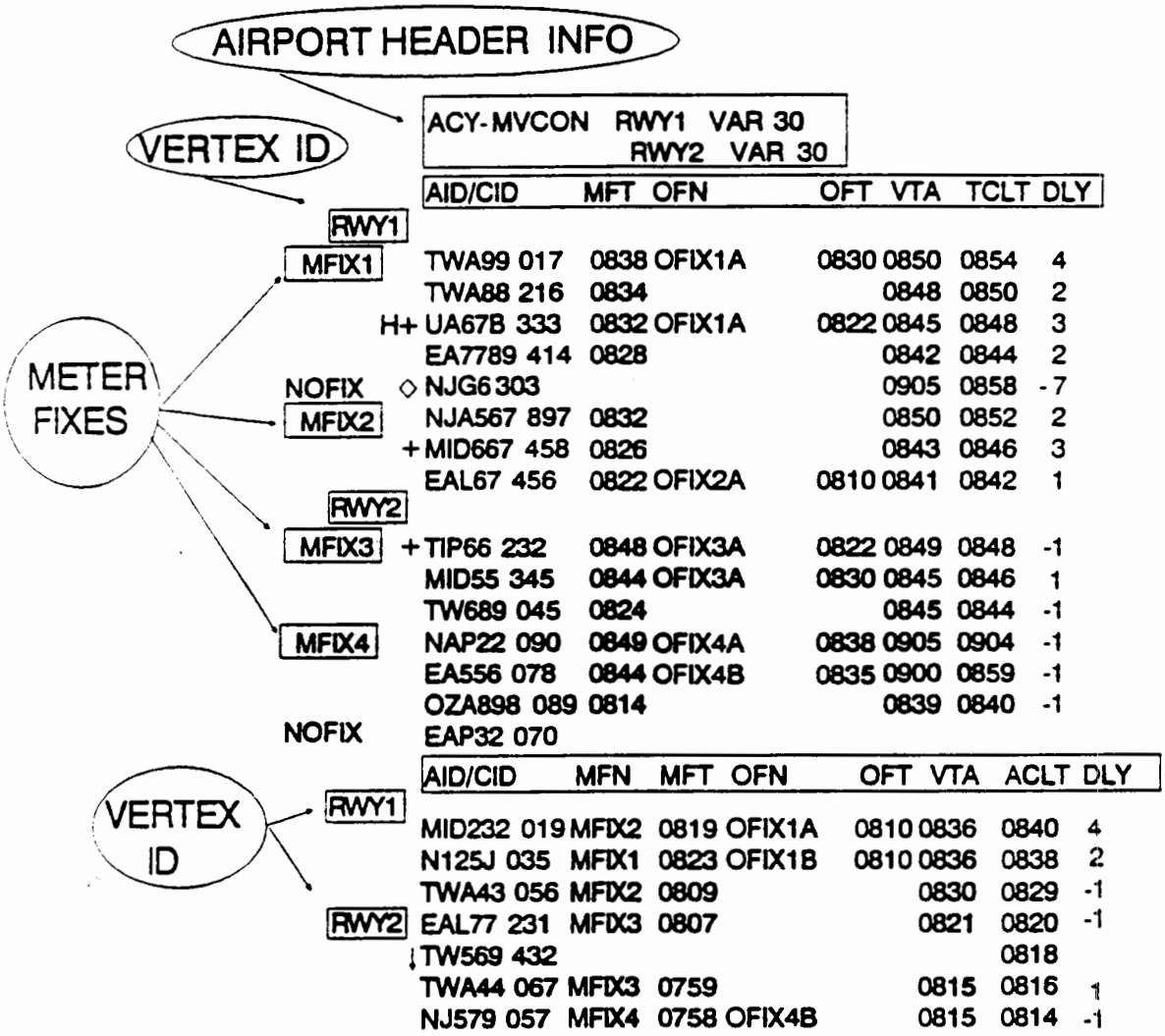

Figure 6-2. ASP Multiple Vertex Metering List Example

ACY-MVCON RWY1 VAR 30
RWY2 VAR 30
FUT CON 0830

		AID/CID	MFT	OFN	OFT	VTA	TCLT	DLY
RWY1								
MFIX1	+	TW326 093	0825	OFIX1A	0810	0836	0840	4
	◇	EA589					0832	1
NOFIX	◇	UA352 519				0840	0838	-2
MFIX2		TW283 610	0821	OFIX2A	0806	0833	0836	3
		NJ54T 220	0819	OFIX2B	0804	0832	0834	2
		TW325 205	0815		0800	0831	0830	-1
RWY2								
MFIX3	H	TW545 302	0818	OFIX3A	0803	0833	0838	5
		NW532 543	0816			0833	0836	3
	+	EA397 209	0814	OFIX3A	0759	0832	0834	2
MFIX4		TW25L 222	0812	OFIX4A	0758	0831	0832	1
		EA393 415	0811	OFIX4B	0756	0831	0830	-1
NOFIX		UAL25 310						

ACY-SVCON RWY1 VAR 60/0815/48

		AID/CID	MFT	OFN	OFT	VTA	TCLT	DLY
RWY1								
MFIX1	H	MID78 058	0809	OFIX1A	0754	0820	0824	4
	+	TWA39 023	0808	OFIX1A	0753	0819	0823	4
MFIX2		EA25 098	0806	OFIX2A	[illegible]51	0818	0821	3
		NJ2J 052	0803		[illegible]815		0818	3
MFIX3		TW92 032	0800	OFIX3A	18		0820	2
	◇	PA392 053					0819	3
MFIX4		EA29 402	0755			0813	0815	2
		TW58T 219	0754	OFIX4A	0739	0812	0814	2
NOFIX		EA232 329				0820	0825	5
		TW569 210				0813	0816	3

	AID/CID	MFN	MFT	OFN	OFT	VTA	ACLT	DLY
RWY1								
	EA353 316	MFIX1	0758	OFIX1A	0743	0812	0813	1
	TW28 208	MFIX2	0757			0811	0812	1
	NP208 335	MFIX4	0751	OFIX4B	0736	0810	0811	1
	MID25 244	MFIX3	0750	OFIX3A	0735	0808	0810	2

Figure 6-3. ASP Meter Position List with a Future Configuration

Figure 6-3 illustrates the format of the arrival information when a current airport configuration is in effect and a future configuration change is pending. This is used when the TMC has advance notice that the particular airport is changing the runway approaches and configuration at some future time. Generally, it is beneficial for the TMC to enter advance knowledge of airport conditions as early as possible. Doing so may lessen the operational impact of the airport change on both the terminal and ARTCC personnel.

The boxes around the headers in figures 6-1, 6-2, and 6-3 are for illustrative purposes only and are not actually displayed on metering lists. The following sections cover in more detail the specifics and usage of the ASP metering position list displays.

6.1.1 Airport Header

The Airport Header displays information reflecting the current (and future, if applicable) status of the airport configuration, the current VAR (and future, if any), any arrival delay, and the identifications of any combined peripheral airports. The airport headers show the status of the most recent metering conditions set up by TMC. Figure 6-4 shows and explains various airport header formats that may be displayed.

In any metering list there may be two possible airport headers, as shown in figure 6-3. One header is for a future configuration and the other for the current configuration. The top airport header is for a future configuration and is designated by "FUT CON" with the effective time. The airport header for the current configuration is displayed below the flights sequenced in the future configuration.

As shown in some of the cases in figure 6-4, an arrival delay may be used to represent a delay to all traffic going to a vertex for a specified period of time. This serves to schedule a break in the stream of traffic. If an arrival delay is pending or in effect, the word "DLY" will follow immediately after the VAR for the specified vertex. The number of minutes the delay will be in effect and the time the delay period will begin is displayed. The information will be deleted at the expiration of the delay period.

1) **APT-CONID RWY1 VAR 45**

where

APT	is the three character airport identification
CONID	is the configuration name
RWY1	is the vertex name
VAR	means the Vertex Acceptance Rate
45	is the entered VAR value

2) **APT-CONID RWY1 VAR 30/1020/45**

In this example, a future VAR change makes the VAR go from 30 to 45 at a time of 1020 in the assigned meter list sequence.

3) **APT-CONID RWY1 VAR 30/1020/45 DLY 015 1030**

Here, in addition to a future VAR change, a vertex delay of 15 minutes has been entered to occur at 1030 in the sequence.

4)

```
APT-CONID   RWY1  VAR  30
            RWY2  VAR  30/1020/45   DLY  015  1030
            RWY3  VAR  20           DLY  010  1020
            RWY4  VAR  48
```

This example shows the various options that may be entered for each vertex in a multiple vertex airport configuration.

5)

```
APT-CONID   RWY1  VAR  45
            RWY2  VAR  30
+ ABC + DEF + GHI
```

Where ABC, DEF, GHI are the three-character airport identifications of the combined peripheral airports.

Figure 6-4. Examples of Headers in ASP Metering Position Lists

6.1.2 ASP Non-Frozen Sublist

The non-frozen sublist of metered flights contains an entry for each metered aircraft assigned a TCLT and scheduled to arrive at the metered airport (or peripheral airport, if combined) displayed in the airport header.

The non-frozen sublist entries are grouped by destination vertex and displayed in the order that vertices are adapted. The meter fix name is only displayed to the left of the first non-frozen entry for that meter fix. In a multiple vertex configuration, each additional vertex identifier follows in a similar manner along with the associated meter fixes. If no flights are destined to a particular vertex, the vertex identifier will not be displayed.

With the above description in mind, the TMC can get a general idea of the traffic flows in the center by a quick examination of the metering list. For example, the TMC can obtain a quick assessment as to the general directions from which the air traffic is approaching a metered airport by the number of flights sequenced at each meter fix. If one meter fix has much more traffic sequenced over it than another meter fix, then an imbalance of arrival sector workload may be brewing. Some TMC coordination may be helpful in rerouting a few flights over the meter fixes that have fewer projected flights. This is called load balancing.

The ASP non-frozen sublist will contain the following header:

AID/CID MFT OFN OFT VTA TCLT DLY

The non-frozen flights will be grouped under this header, first by vertex identification, then subgrouped by meter fix. The following provides a brief explanation of the non-frozen data fields.

AID/CID Aircraft Identification/Computer Identification. The following symbols can precede the AID in this list:

Symbol	Condition
+	Heavy jet indicator
H	Indicates an aircraft in hold status
◇	Indicates a manually assigned TCLT

MFT Meter Fix Time; The displayed MFT is the assigned MFT for each flight and it includes all necessary delay. This differs from ERM-1A where delay, only up to the AMDT parameter, was included in the assigned MFT.

In ASP, the displayed MFT is in hours and minutes (hhmm) and is computed as:

$$MFT = MFT_u + DLY$$

where MFT_u = Undelayed Meter Fix Time
MFT = Assigned and displayed Meter Fix Time

and DLY is the total delay equal to the TCLT (or ACLT) minus the predicted VTA.

OFN Outer Fix Name; the OFN may be from two to twelve alphanumerics, just as any NAS fix may be. This differs from the character length requirements for other metering fixes such as the MFN and Vertex Name which are 2-5 alphanumerics each.

OFT Outer Fix Time; the displayed OFT, in hours and minutes (hhmm), includes the total delay minus the AMDT parameter adapted for that meter fix/outer fix pair. For flights with assigned delay, the assigned OFT is computed as follows:

$$OFT = OFT_u + (DLY-AMDT)$$

where OFT_u = Undelayed OFT

and other terms have been previously defined.

For flights where a speed-up situation exists (e.g., manual assignments), the displayed OFT represents all the total delay necessary to make up the time. In this case the assigned OFT is computed as follows:

$$OFT = OFT_u + DLY$$

where DLY is a negative value representing the reverse of delay which is a speed-up situation.

VTA Vertex Time of Arrival; this is the current metering projected time of arrival at the vertex for each flight. The VTA is dynamic for each flight in that it will change in response to Flight Plan amendments, NAS time updates, or tracking data updates (when within the outer ring, ORNG, parameter). The VTA is displayed in hours and minutes (hhmm).

TCLT Tentative Calculated Landing Time; the TCLT is the metering assigned time which results after the non-frozen flights are sequenced.

DLY The DLY field represents the total delay to be absorbed by each flight. As stated previously, the delay is equal to TCLT (or ACLT) - VTA. If the delay is greater than 99 minutes, the characters "XX" will be displayed; if it is zero (0), the field will be blank. If the VTA is later than the TCLT/ACLT, a negative delay will be displayed. The displayed delay for each flight is updated in response to VTA and/or TCLT/ACLT changes.

6.1.3 ASP Frozen Sublist

The frozen sublist header is displayed below the non-frozen flights for a given airport configuration, when one or more frozen flight entries exist. If no non-frozen entries are present, the frozen sublist header is displayed directly below the airport header. The ASP frozen sublist header is displayed as follows:

AID/CID MFN MFT OFN OFT VTA ACLT DLY

where all terms have been previously defined.

The frozen sublist contains an entry for each metered aircraft assigned an Actual Calculated Landing Time (ACLT). The display format for the freeze sublist will be subgrouped by the destination vertex and sequenced in descending order by ACLT. The data fields are the same as those described for the non-frozen list, with the exception of the TCLT now being the ACLT. Additionally, the AID may also be preceded by the symbol '↓'. This "down arrow" symbol indicates that the frozen flight is no longer eligible for metering. The flight remains sequenced with all other information deleted except the AID/CID and ACLT. This serves to prevent metered flights from rippling down unless the down arrow flight is manually deleted by the TMC.

One important difference between ERM-1A and the new ASP processing is that the VTA of frozen flights will now be updated. This means that NAS time updates to frozen flights will cause their respective VTAs to be updated accordingly. Thus, the updated VTA will be reflected in the metering position list display, and the total delay will be recomputed and displayed dynamically as well.

6.1.4 Overflow

If the number of metered flight entries exceed the number of lines available for display on the left side of the PVD, the excess flights are displayed on the right side, starting at the top of the list. The sublist header will not be redisplayed. When the meter list entries have filled both columns of the PVD, the remaining flights will be stored and the word "OVERFLOW" will be displayed at the bottom of the right-hand column of the PVD.

6.1.5 Special Considerations

The metering position list represents the real-time current status of flights as each progresses through the regions of metering influence. The following are some of the special considerations that the TMC should be aware of when interacting with the ASP metering position list (or an ESP metering position list or an ASP sector metering list).

Keep in mind that the displayed times are in hours and minutes (hhmm). So while the displayed times are rounded to the nearest minute, the internally computed metering times are to the nearest one-hundredth of a minute. This effect can be observed when a VAR of 48 is entered. Here flights are sequenced with an AAI of 60/48 equal to 1.25 minutes. An example sequence of both internal and displayed TCLTs, illustrating these differences, is shown in figure 6-5. This is something to be aware of, since the accuracy goal of metering at the en route level is generally to try to meet the assigned metering times within ± 1 minute.

6.2 ASP SECTOR METERING LISTS

Sector metering lists can be displayed on the PVD at the sector positions containing the adapted meter and outer fixes. These sector lists are requested by the TMC via an AD message input at the metering position PVD. The sector metering list header will be displayed at the meter/outer fix sector when at least one entry is displayed for that sector. The header will contain the airport identifier. If one or more peripheral airports are combined with a focal metered airport, only the focal airport's identifier will be displayed. If sector lists are requested for more than one airport, the sector lists are displayed in ascending alphabetical order by the airport identifier.

Sublist headers will consist of a meter fix name or outer fix name. A sublist header will be displayed when at least one flight entry exists for that meter/outer fix. Sublists will be displayed in ascending alphanumerical order by meter/outer fix name.

Vertex Acceptance Rate = 48, AAI = 1.25

Internal Spacing (Min)		Internal TCLT		Displayed TCLT		Displayed Spacing (Min)
		1007.50	——→	1008		
1.25	<				>	2
		1006.25	——→	1006		
1.25	<				>	1
		1005.00	——→	1005		
1.25	<				>	1
		1003.75	——→	1004		
1.25	<				>	1
		1002.50	——→	1003		
1.25	<				>	2
		1001.25	——→	1001		
1.25	<				>	1
		1000.00	——→	1000		

Figure 6-5. Internally Computed vs Displayed Time

6.2.1 Sector List Entries

A meter/outer fix sector metering list entry will contain the AID, the assigned meter/outer fix time, and the individual aircraft delay time if a delay has been calculated. In outer fix sector lists, a frozen entry will be preceded by a pound (#) symbol one space to the left of the AID. If the flight plan for a meter fix or outer fix sector list entry contains a heavy jet indicator in Field 03 (aircraft data), the symbol "+" will be displayed two spaces to the left of the AID. A flight entry for an aircraft which is in "hold" will be preceded by the letter "H" three spaces to the left of the AID.

The aircraft delay time is the calculated time, in minutes, that a flight must be delayed in order to arrive over the meter/outer fix at the metering assigned time. This value is revised for both frozen and non-frozen entries as time updates are received for the flights.

If the delay is greater than zero and less than 100, it will be displayed as one or two digits with leading zeros suppressed. If the delay is greater than 99 minutes, the delay field will contain the characters "XX" or, if the delay is zero, the field will remain blank. If the flight has been assigned a TCLT which is earlier than the VTA, the delay value will be negative and will be displayed as such. This will only occur when the PTOL is large enough to allow the situation, or under a special case of a manual assignment.

Sublist entries will be displayed in descending order by meter fix or outer fix time, below the respective meter fix or outer fix sublist headers. Figure 6-6 is an example of an ASP sector metering list for a sector which contains both a meter fix and several outer fixes.

6.2.2 Display Eligibility

A metered aircraft will be eligible for display in a meter fix sector list at parameter FCLT or MLDI minutes prior to the flight plan CTA at the meter fix. For flights with a true airspeed less than or equal to the parameter FSPD, parameter MLDI will be used. Otherwise, parameter FCLT is used. Manually assigned flights without flight plan information and NOFIX flights will not be displayed in the meter fix list.

	ABQ	
	C3A	
UA639	0706	2
+#NW8436	0659	1
	C38	
TW163	0706	2
	D2W	
TW222	0840	
H+ UA747	0835	2
	D3A	
NE857	0752	
#AA701	0745	2
#PSA328B	0743	

Figure 6-6. ASP Meter Fix/Outer Fix Sector List

A flight entry will be displayed in the outer fix sector list at Outer Fix Display Interval (OFDI) minutes prior to the flight plan CTA at an outer fix. Manually assigned arrivals without flight plan data and NOFIX flights will not be displayed in the outer fix sector list.

6.2.3 Deletion of Entries

An entry will be deleted from the meter fix or outer fix sector list under any one of the following conditions:

1. The entry will be deleted from the sector list at Sector List Drop Interval (SLDI) minutes after the entry's assigned fix time.

2. When an AD message is entered at the metering position to manually delete the entry.

3. When a message is entered at the sector position to manually suppress the entry.

4. When a frozen flight becomes a 'down arrow' flight, the entry is removed from the meter fix or outer fix sector list.

5. The flight is no longer eligible for ASP metering.

A manually suppressed meter fix or outer fix entry will not be redisplayed unless its time changes by one or more minutes.

6.3 ESP METERING POSITION LIST

The general format of the ESP metering position list is similar to the ASP metering position list. However, some of the various ESP data fields are different to support the ESP application. As in the ASP format, the ESP metering list can have both frozen and non-frozen sublists. Additionally, the ESP configurations may be single vertex or have up to four adapted external fixes as vertices. Likewise, both current and future ESP configurations, VARs, and/or Airport (or vertex) Arrival Delay may be entered by the TMC. Any of these metering changes are reflected in the displayed ESP metering position list.

While the above metering options exist for both ESP and ASP applications, it is generally thought that ESP may require less airport condition changes than ASP. Also, most ESP adaptations will contain only one or two vertices for a given ESP airport configuration. Generally, once an ESP configuration is entered, other than manual assignments and VAR changes, it is not expected to change as much as an ASP situation would.

Illustrated in Figure 6-7 is a metering list for a typical ESP single vertex application. More will be covered on the specifics of the list in following sections. Note, however, that in both single vertex and multiple vertex configurations, flights that are not projected through an adapted ESP wedge, but are destined to the external ESP airport, are listed as "NOVRTX" flights. These flights are not sequenced and assigned times at a vertex, but are listed with their AID/CIDs.

Figure 6-8 shows the ESP metering list for the case of a multiple vertex ESP airport configuration. The ESP flights are grouped in both the non-frozen and frozen lists according to the respective vertex. Note that directly to the left of the AID/CID is a sector position identifier. This is the projected sector at which each ESP flight will leave the ARTCC and be subsequently handed off to the adjacent ARTCC. Another new data field is the LOC column. This is the currently controlling sector or facility of each ESP flight.

Figure 6-9 illustrates the format of the ESP metering position list when a future ESP configuration is pending. This situation may occur when it is required to sequence aircraft over an additional or alternative vertex at a future time. When advance notice of this situation is presented, it is advantageous to use the future configuration AD message so that the ESP automation reflects the proper assigned metering sequence.

6.3.1 ESP Airport Header

The airport header shows the status of the most recent metering conditions set up by the TMC. The ESP airport header is displayed in the same format as used for the ASP header information. The only difference is that the vertex referred to in the airport header is the ESP external reference fix at which flights are sequenced, rather than an ASP vertex. Refer to figure 6-4 for the various airport header options.

Just as in ASP, the TMC can also enter an Arrival Delay period for ESP flights being sequenced at a particular vertex or for all flights destined to an ESP airport. When an Arrival Delay is in effect, this will be indicated in the appropriate ESP airport header, as shown in some of the case in figure 6-4.

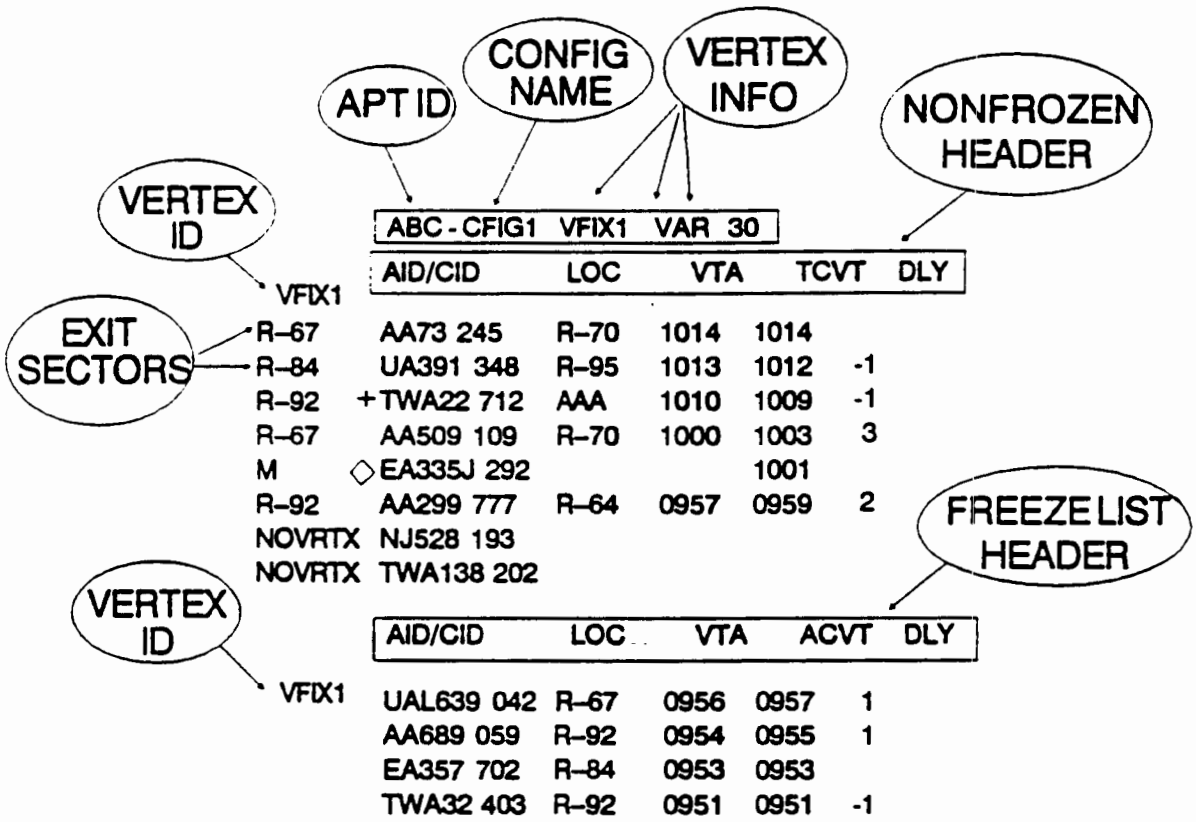

Figure 6-7. ESP Metering Position List Single Vertex Example

APT ID

CONFIG NAME

VERTEX INFO

NONFROZEN HEADER

ABC - MVCON VFIX1 VAR 30
VFIX2 VAR 48

VERTEX ID

EXIT SECTORS

	AID/CID	LOC	VTA	TCVT	DLY
VFIX1					
R-67	EA589 200	R-70	1019	1020	1
R-84	+ TWA592 112	R-95	1018	1017	-1
R-67	MID509 609	AAA	1011	1012	1
R-67	PSA389N 300	R-70	1011	1010	-1
VFIX2					
R-84	PNJ25T 098	R-21	1018	1019	1
R-92	+ AA579 070	R-54	1017	1017	
R-92	TW102 500	R-54	1017	1016	-1
R-92 H	EA630 401	R-32	1009	1011	2
R-84	PTB293 309	R-21	1009	1010	1
M	◇ AA581			1008	
R-84	EA792 251	R-64	1006	1007	1
NOVRTX	EA420 193				
NOVRTX	TBA329 118				

FREEZE LIST HEADER

VERTEX ID

	AID/CID	LOC	VTA	ACVT	DLY
VFIX1					
	UAL652N 042	R-23	1005	1006	1
	◇ MID292			1004	2
	NJA25 325	R-25	1001	1002	1
	TW28J 259	R-25	1000	1000	
VFIX2					
	AA289 359	R-28	1005	1006	1
	↓ MID257 255			1005	
	EA428	R-27	1002	1003	1
	TWA268 309	R-27	1000	1002	2

Figure 6-8. ESP Metering Position List Multiple Vertex Example

LAX - MVCON VFIX1 VAR 30
FUT CON 1020 VFIX2 VAR 48

	AID/CID	LOC	VTA	TCVT	DLY
VFIX1					
R–67	TW93J 201	R–70	1024	1026	2
R–67	+ EA359 109	R–70	1023	1024	1
R–67	MID283 382	AAA	1020	1022	2
R–67	EA283 272	R–83	1019	1020	1
VFIX2					
R–84	MID352J 423	R–34	1025	1026	1
R–84	◇NJT239 549	R–81	1028	1024	-4
M	◇TWA72			1023	
R–84	EA354 528	PHX	1019	1020	1

LAX - SVCON VFIX1 VAR 30

	AID/CID	LOC	VTA	ACVT	DLY
VFIX1					
R–67	PSA284 259	R–54	1015	1018	3
R–67	EA34 544	R–54	1012	1016	4
R–92	+ TWA288 352	AAA	1011	1014	3
R–92	MID534 272	R–21	1010	1012	2

	AID/CID	LOC	VTA	TCVT	DLY
VFIX1					
	EA382 267	R–67	1008	1010	2
	+ MID425 501	R–92	1007	1008	1
	AA82 40	R–67	1007	1006	-1
	↓ PTA59 283			1002	
	+ AA888 458	R–92	0959	1000	1

Figure 6-9. ESP Metering Position List with a Future Configuration Pending

6.3.2 ESP Non-Frozen Sublist

The ESP non-frozen sublist consists of an entry for each metered flight that has been assigned a Tentative Calculated Vertex Time (TCVT). The non-frozen sublist will contain an entry for each data field in the non-frozen header. The ESP non-frozen sublist header and entry format are as follows:

```
                AID/CID          LOC   VTA   TCVT  DLY
VFIX1
R-dd IIILaaaaaa ddd              R-dd  hhmm  hhmm  dd
```

The non-frozen ESP flights are grouped according to their respective vertex. The left most data field, R-dd, of each non-frozen entry is the sector through which the flight is projected to exit the metering center. If the non-frozen entry is a manual assignment for which no active flight plan has yet been associated, then an "M" character will be displayed in lieu of the exit sector ID.

Immediately to the right of the exit sector identifier are three spaces reserved for the special indicators for Hold, Heavy Jet, and Manual Assignment symbols. The next data fields are the AID/CID followed by the LOC data field. The LOC data field designates the identifier of the sector or facility currently in control of the metered ESP flights. Subsequently following are the VTA, TCVT and DLY data fields.

Any update to a flight's VTA will be reflected in the non-frozen list. These changes will cause the total delay to be recomputed and displayed dynamically on the PVD as well. Sequencing changes due to time updates, manual assignments, airport environment changes, etc., will result in the update of the affected fields in the displayed list.

The non-frozen portion of an ESP meter list is displayed with sublist entries listed in descending order by TCVT. The single vertex identifier is listed to the left of the meter list, on the line above the first flight entry. If the current airport configuration consists of more than one vertex, the flight entries are first grouped by destination vertex and then ordered by TVCT. Each vertex identifier is displayed to the left side of the meter list on the line immediately above its respective group of flight entries. Vertex groups are listed in the order in which the vertex identifiers are adapted for the current airport configuration. If there are no flights destined to a particular vertex, the vertex identifier will not be displayed.

If the bearing for a flight from the projected boundary crossing point to the ESP airport does not fall within the range of bearings adapted for any of the vertices in any current or future configuration, the flight will be designated as a "NOVRTX" flight. This flight will be grouped with other NOVRTX flights at the bottom of the non-frozen sublist. A NOVRTX entry will consist of an AID, CID, and the word "NOVRTX" displayed to the left of the AID in the exit sector field.

A flight, with no associated flight plan in ESP, that has received a manually assigned TCVT will be displayed with the letter "M" in the exit sector field and the symbol "◇" to the left of the AID. The flight will be sequenced by TVCT with other entries in the non-frozen portion of the meter list. If the airport is in a multiple vertex configuration, the manually assigned flight will be inserted into the list under the vertex specified in the manual assign message.

If the manually entered aircraft later becomes eligible for the manually assigned entry, the CID, the currently controlling sector or facility (LOC) and the exit sector will be displayed for the flight. Using the flight plan information, the VTA and delay will be calculated and also displayed. The manual assignment indicator "◇" will remain displayed; however, the appropriate exit sector information will replace the "M" in the exit sector field. If the flight plan indicates that the flight's vertex is different than the one to which the flight was originally manually assigned, the TCVT will be redetermined using the flight plan information. If the vertex is the same as the one entered in the message, then the entry will remain assigned to the manually assigned TCVT. If the flight plan indicates that the entry does not qualify for any vertex (NOVRTX flight), the flight will lose its TCVT and be moved to the NOVRTX portion of the ESP meter list.

6.3.3 ESP Frozen Sublist

The frozen sublist header is displayed below the non-frozen flights for a given airport configuration, when one or more frozen flight entries exist. If no non-frozen entries are displayed, the frozen sublist header is displayed directly below the airport header. The ESP frozen sublist header is displayed as follows:

AID/CID LOC VTA ACVT DLY

The freeze list header is the same format as the non-frozen header, except that the assigned time slots are displayed as Actual Calculated Vertex Times (ACVTs). Recall that ESP flights automatically go from the non-frozen to frozen portion of the metering list at the parameter FCLT minutes prior to reaching the particular ESP vertex.

The display format of the freeze sublist will differ for single and multiple vertex airport configurations. For the single vertex situation, freeze sublist entries will be displayed below the freeze sublist header in descending order by ACVT. In a multiple vertex configuration, freeze sublist entries will be grouped by destination vertex and sequenced in descending order by ACVT. The vertex identifier will be displayed to the left of the AID of the first entry associated with the vertex. The vertex identifier will not be displayed unless one or more entries exist for the vertex. Subsequent entries for the same vertex will not contain the vertex identifier. Vertex groups are listed in the order that the vertex identifiers are adapted for the current configuration.

Any updates to the VTA of frozen flights will be reflected in the metering position list display, and thus updating the total delay. Sequence changes due to manual deletions, manual assignments, airport environment changes, etc., will result in the update of the affected fields of the displayed list.

If an ACVT has been manually assigned for a flight, an entry will be listed in the frozen sublist and be denoted by the symbol "<>" to the left of the AID. As with non-frozen manual assignments, a valid vertex name must be specified in the manual assign message and the flight will be displayed under that vertex. If an entry with a manually assigned ACVT has no referent flight plan, the exit sector, CID, LOC, VTA, and DLY fields will remain blank. If a flight plan later becomes available that matches the AID of the manually assigned entry, the CID will be applied and the VTA and delay fields will be calculated and displayed. Also, the exit sector and currently controlling sector or facility (LOC) will be displayed. If the flight plan indicates that the flight's vertex is different than the one to which the flight was originally manually assigned, the ACVT will be redetermined using the flight plan information. The flight will then be redisplayed under that new vertex. If the vertex is the same as the one entered in the message, then the entry will remain assigned to the manually assigned ACVT. If the flight plan indicates that the entry does not qualify for any vertex (NOVRTX flight), the flight will lose its ACVT and be moved to the NOVRTX portion of the ESP meter list.

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GLOSSARY

AAI	Aircraft Arrival Interval
AAR	Airport Acceptance Rate
ABCT	Active Boundary Crossing Time
ACES	Adaptation Controlled Environment System
ACLT	Actual Calculated Landing Time
ACVT	Actual Calculated Vertex Time
AD	Arrival Display
ADLY	Arrival Delay
AID	Aircraft Identification
AM	Amendment
ARTCC	Air Route Traffic Control Center
ASP	Arrival Sequencing Program
ASSR	Automatic Swap Slot Region
BCPT	Boundary Crossing Point
CID	Computer Identification
CLLE	Calculated Landing List Eligibility
CLS	Calculated Landing Sequence
CLT	Calculated Landing Time
CON	Vertex Configuration
CP	Change Parameter
CRD	Computer Readout Display
CS	Resector
CTA	Calculated Time of Arrival
CVS	Calculated VErtex Sequence
CVT	Calculated Vertex Time
DM	Departure
DYSIM	Dynamic Simulation
EP	Examine Parameter
ERM	En Route Metering
ESAF	En Route Spacing Altitude Filter
ESP	En Route Spacing Program
FCDI	Flow Control Display Interval
FCLT	Freeze Calculated Landing Time
FCPU	Free Track Calculated Vertex Time Percentage Update
FDP	Flight Data Processing
FLAT	Flight Plan Aided Tracking
FP	Flight Plan
FSPD	Freeze Speed Threshold
FTUI	Flow Time Update Interval

HDVS	Heading Deviation Allowable to Perform Velocity Smoothing
HM	Hold
ID	Identifier
KVDT	Keyboard Video Display Terminal
LAC	Longitudinal Association Checking
MBCT	Metering Boundary Crossing Time
METR	Metering Activation Switch
MFN	Meter Fix Name
MFT	Meter Fix Time
MIT	Miles-In-Trail
MLD	Meter List Display
MLDI	Meter List Display Interval
MTUI	Metering Time Update Interval
MTUT	Metering Time Update Threshold
NOVRTX	No Vertex
OFDI	Outer Fix Display Interval
OFN	Outer Fix Name
OFT	Outer Fix Time
ORNG	Outer Ring
PCTD	Priority Control Time Determination
PCTI	Priority Control Time Interval
PR	Progress Report
PTI	Priority Time Interval
PTOL	Priority Tolerance
PVD	Plan View Display
QAK	Quick-Action Key
QN	Accept Handoff
RS	Remove Strip
SLDI	Sector List Drop Interval
STVS	Subcycles After Turn Before Velocity Smoothing
TAS	True Air Speed
TCLT	Tentative Calculated Landing Time
TCVT	Tentative Calculated Vertex Time
TMC	Traffic Management Coordinator
TMU	Traffic Management Unit
TMW	Traffic Management Workstation
TRACON	Terminal Radar Approach Control Facility

VAR	Vertex Acceptance Rate
VTA	Vertex Time of Arrival