FINAL REPORT

Metrocard Program

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Office of Technical Assistance and Safety
FEDERAL TRANSIT ADMINISTRATION
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by

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More information on the Metrocard program is available from:

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I. INTRODUCTION

Metrocard Program Overview

The Metrocard program is demonstrating the use of a stored value fare card to pay fares on the buses of three operators in the Los Angeles area. With a Metrocard, a passenger prepays an amount for bus fares. The passenger determines how much stored value to place on the card. The validation equipment on board the bus reads the magnetic code on the card and subtracts the appropriate fare. The remaining value is displayed for the passenger. Though the equipment does not print the exact amount remaining, an indicator is printed on the back of the card when the remaining value is less than $10.00. Additional value can be added to the card at a sales outlet. As such, it is intended that passengers will keep the same card over time. Metrocards are printed on plastic stock making them very durable.

Metrocard has been developed as a demonstration of a seamless fare for the many operators in the Los Angeles Area, under the sponsorship of the Los Angeles County Metropolitan Transportation Authority (MTA). Pilot testing of the Metrocard was performed in August 1993 by Culver CityBus. Metrocard was introduced in revenue service to the public in April 1994. Currently, Metrocard can be used on the buses of three operators in Los Angeles County: Foothill Transit, Montebello Bus Lines, and Culver CityBus. Metrocard is not available on MTA operated bus service and other transit operators in Los Angeles County. An overview of the transit services operated by Metrocard providers is presented below:

- Foothill Transit serves the local communities, major activity and employment centers in the San Gabriel and Pomona Valleys. It operates 192 buses during the peak period. Foothill Transit also provides express bus services to downtown Los Angeles and downtown Pasadena. Metrocard equipment was installed on the 107 buses at the Upland garage and 108 buses at the El Monte garage.

- Montebello Bus Lines has provided public transit service continuously since 1931. It provides service to the City of Montebello and its surrounding communities as well as to downtown Los Angeles. Montebello Bus Lines operates 33 buses during the peak period. Metrocard equipment was installed on 54 buses.

- Culver CityBus is the second oldest continuously operated municipal bus system in California. Service is provided to Culver City and its surrounding communities. In addition, direct service is operated daily connecting UCLA and Los Angeles International Airport. Culver CityBus operates 24 buses during the peak period. Metrocard equipment was installed on 28 buses.

Monitoring Program Overview

Recognizing the importance of these innovations to the transit industry, and continuing its efforts to promote further fare integration, the Federal Transit Administration has sponsored the monitoring of the Los Angeles Metrocard demonstration. Monitoring assistance has been provided to the MTA and the participating transit operators through the FTA's Office of Technical Assistance and Safety, Service Assistance Unit.

The Metrocard monitoring period was the four months from September 1, 1994 through December 31, 1994. The early start-up months were eliminated from the review period. Performance was monitored in three basic areas: Metrocard sales, usage characteristics, and equipment reliability. The monitoring efforts consisted of both primary and secondary data collection. A survey of Metrocard ticket users was conducted by the operators in early 1995. The trends in Metrocard sales and equipment reliability over the monitoring period were recorded and analyzed. These results will assist the local participants and other interested observers in understanding the Metrocard program and pursuing transferable components.

Monitoring Report Organization

This report presents the results of the Metrocard monitoring effort. The report is organized into the following sections:

- Metrocard Program Description - a description of the Metrocard and the equipment used in the program;
- Metrocard User Survey - the findings from an on-board survey of users;
- Sales and Ridership - the volumes and trends in Metrocard sales and usage during the four-month monitoring period;
- Equipment Reliability - the "RMAT" testing and results; and
- Conclusions and Program Future - a discussion of the "lessons learned" and future plans for Metrocard in the Los Angeles area.

II. METROCARD PROGRAM DESCRIPTION

The stored value card is not new technology. Nor is its application within the transit industry. However, in the past, stored value cards within the U. S. transit industry have been in one of two categories:

- plastic cards with a stored number of trips for a specific station pair or trip type (e.g., PATCO in South Jersey and Metra Electric in Chicago)
- heavy paper cards with a stored dollar amount and capability to print the value remaining (e.g., WMATA in Washington, DC and BART in San Francisco)

The Los Angeles Metrocard advances this technology with several innovations. The current Los Angeles Metrocard is a plastic card with a stored dollar amount. The dollar amount to be encoded on the card is determined by the purchaser. An indicator is printed on the card when the remaining stored value is below $10.00, showing the declining balance. A unique feature of their stored value fare card is that value can be added to a Metrocard.

A stored value fare card has the potential to make fare collection for intermodal and interagency transit trips "seamless". Past efforts in the Los Angeles area have included extensive interagency transfer agreements and some multiple operator passes. Metrocard enables participating agencies to monitor ridership more carefully and allocate fare revenues according to actual usage.

This section provides a description of the equipment used in the Metrocard program, the procedures for using a Metrocard and accounting for that trip among the participants, and the institutional relationships among the participating agencies.

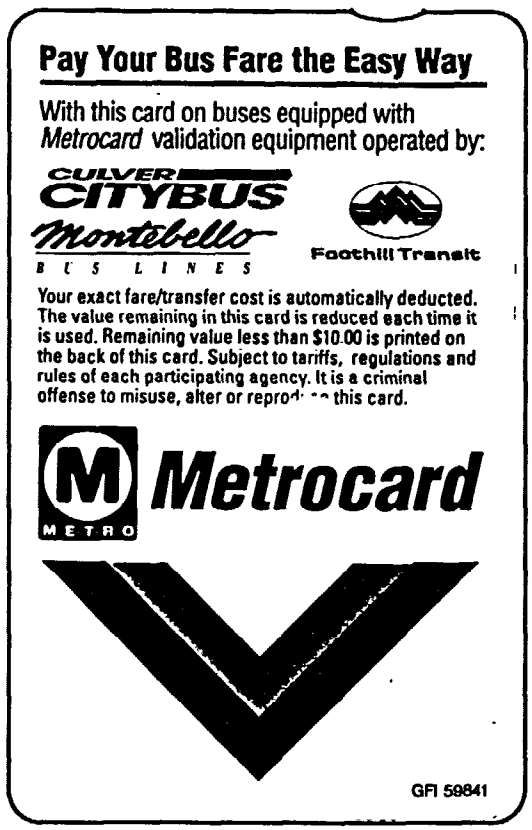
The Metrocard

Central to the Los Angeles Metrocard program is a magnetic stored value fare card. A Metrocard is the size of a credit card, but only half the thickness. As illustrated by the sample in Exhibit II-1, one side of the Metrocard is a magnetic track, which is used to store information. The information contained on this track includes the location and date the card was first issued, information related to the last transaction and the current value of the card. All of these data are written twice on the same track in order to reduce data loss if the card becomes damaged. The card is covered with a thermal print surface on the same side as the magnetic track. The thermal surface is used to print the initial value of the card. This surface also is used to print markers on a scale to indicate the remaining value of the card, when the remaining value is under $10. The Metrocard technology is capable of providing for discounts, peak/off-peak differential, and a variety of other fare types. Currently, none of these features are being utilized.

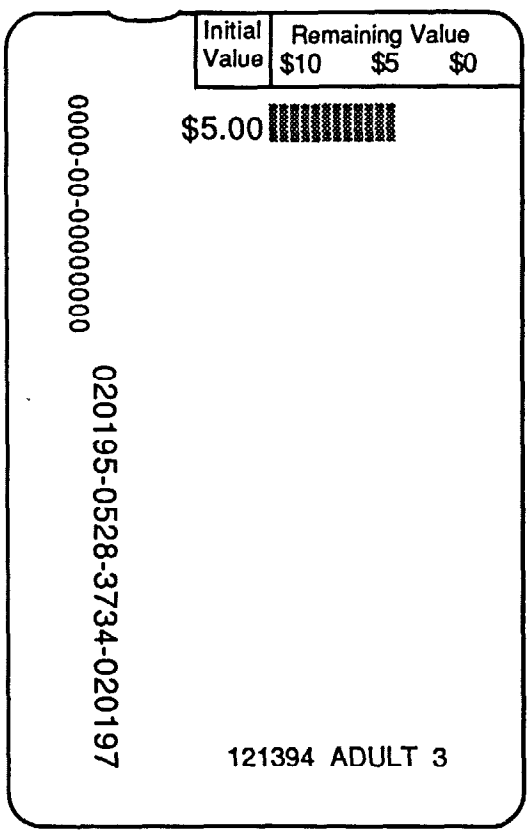
Metrocards are encoded at the time they are purchased. Patrons can purchase Metrocards in any denomination starting with as little as $5.00. A Metrocard can be purchased at any one of eight sales outlets. The following is a list of locations where Metrocards can be purchased:

- Foothill Transit
  - West Covina Transit Store
  - Puente Hills Transit Store
  - Pomona Transit Store
  - Claremont Transit Store
  - Monrovia Community Center
- Montebello Bus Lines
  - Montebello Corporate Yard
- Culver CityBus
  - City Hall (Culver City)
  - City Yard

Exhibit II-1
Metrocard Ticket



FRONT



BACK

Enlarged View

Furthermore, value can be added to the cards in any increment the patron chooses from $5 to $150. Value can be added at any of the sales locations listed above.

Metrocard Equipment

There are three types of equipment that are involved with the sale and use of Metrocards: personal encoding machines (PEM), the bus validation unit (BVU), and the operator control unit (OCU). The passenger interfaces only with the BVU. PEMs are used by the sales agents to issue and add value to Metrocards. The OCU is used by the bus operator to control how Metrocards are processed by the BVUs. Each of these units is described in more detail below.

Personal Encoding Machines (PEM) - Metrocards are issued through the PEM unit. The PEM unit is controlled by the sales agents. Adult Metrocards are pre-loaded into the PEM and issued automatically at the time they are purchased. Should a patron requests any other type of Metrocard, the agent then inserts an unissued card into the PEM. There are four types of Metrocards: adult, student, senior and disabled. The Metrocard is encoded by the machine with the following information:

- Initial value
- Date of issue
- Expiration date
- Location of issue
- Machine number

The PEM unit also can be used to add value to previously purchased Metrocards. The agent inserts the patron's Metrocard into the PEM, enters the value to be added, and the Metrocard is encoded with the added value.

All of the information related to a Metrocard transaction is stored on a hard disk system contained in the PEM. The PEM units are connected via modem to an agency computer system (ACS) and a central computer system (CCS). All of the transaction data in the PEM's memory are uploaded to the ACS and CCS through this link.

The PEM unit also can transfer data from one Metrocard to a replacement card. Further, the PEM unit can read a Metrocard to determine if it is damaged. If the PEM can not read the Metrocard, the type of error encountered is displayed on the PEM display.

Bus Validation Unit (BVU) - When boarding a bus, a passenger using a Metrocard must insert it into the BVU. The BVU is mounted directly on the bus farebox. The BVU reads the Metrocard, determines if there is sufficient value to pay the fare, deducts the appropriate fare and encodes the remaining value on the card. The BVU has a display that shows the passenger the remaining value on the card. If the value on the card is under $10, the BVU prints markings on a scale to indicate the remaining value. This scale is located on the same side of the Metrocard as the magnetic track (see Exhibit II-1).

Passengers making inter-agency and local transfers must inform the driver before inserting the Metrocard into the BVU so that the necessary information can be keyed into the OCU. Upon inserting the Metrocard, the BVU determines if a valid transfer is being made.

The BVU is equipped with a bi-directional transport mechanism. When a Metrocard is inserted it passes over a read head that sends the information to a microprocessor built into the BVU. The microprocessor determines if the card is valid, deducts the required fare and determines the remaining value. The card reverses directions when it reaches the end of the transport and passes over a write head that encodes the revised information on to the card. As the card emerges it passes over another read head that verifies that the revised information is correct. If the BVU detects a problem with the card, the transport will reverse directions and attempt to read the card again. The OCU will display an error code if the BVU is unable to read the card after three attempts, and the card will be returned to the passenger.

Operator Control Unit (OCU) - The OCU consists of a panel of buttons and a display that the operator uses to program the BVU. The OCU has a 16-button keypad and a 2-line display that shows the operator what is happening during each transaction. When a Metrocard is inserted into the BVU, the BVU presents the transaction's information to the operator on the OCU display. Certain transactions require operator input from the OCU, such as transfers and special fares (e.g., family fare or zone fare).

The operator logs into the BVU via the OCU panel at the beginning of the shift. The operator enters his/her ID number, route number and run number. In addition, the bus operator must select the trip number, fare, cut time for transfers and the direction the bus will be travelling so that the direction can be encoded on any transfers that are issued. At the end of each trip the operator must reset the cut time and direction.

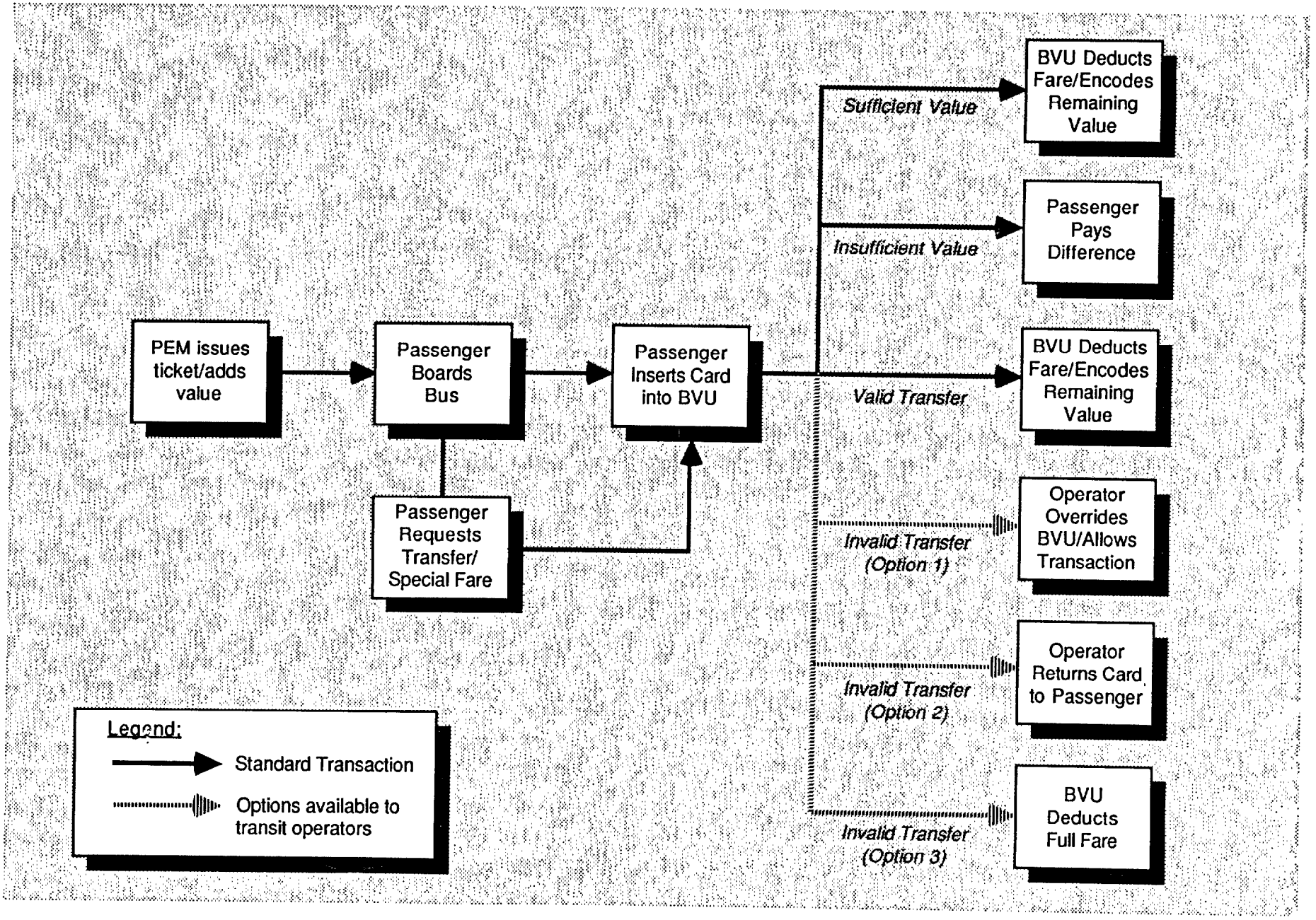
At the end of the last trip, the operator logs off the OCU. This clears that operator's identification number from active memory and enables the next operator to log-in properly.

Metrocard Use

Metrocard is unique in that it allows patrons to make a variety of trips using a single instrument. Passengers can use a Metrocard to pay the base fare upon boarding the bus. This can be either the adult base fare or the reduced fare offered to students, seniors and persons with disabilities. A Metrocard can be used for transfers within the same transit system. It also can be used to make inter-agency transfers. A diagram showing the current alternative for Metrocard users is presented in Exhibit II-2.

Using a Metrocard is a very simple process. Upon boarding a bus, the Metrocard user has two options available. The passenger can simply insert his/her Metrocard into the BVU for payment of the full fare or, the passenger may request a transfer. The following describes how each of these transactions take place.

Exhibit II-2
Current Alternatives for Metrocard Users



- Full Fare - If a passenger is paying the full fare and only riding one vehicle (i.e., no transfer), he/she simply inserts the Metrocard into the BVU. The BVU deducts the appropriate fare, encodes the remaining value and returns the card to the passenger.

  If a Metrocard does not contain sufficient value to pay the fare due, the driver alerts the passenger and the passenger is required to pay the difference by depositing cash in the farebox.

- Transfers/Special Fares - If a passenger is making a transfer or requests a special fare (e.g., family fare or zone fare), he/she must inform the driver before inserting his/her Metrocard into the BVU. The driver must key the request into the OCU. At this point the passenger inserts the Metrocard into the BVU. If the transfer/special fare request is valid, the BVU deducts the appropriate amount, encodes the remaining value and returns the card to the passenger. If the BVU determines the request to be invalid, the operator can take one of three actions:

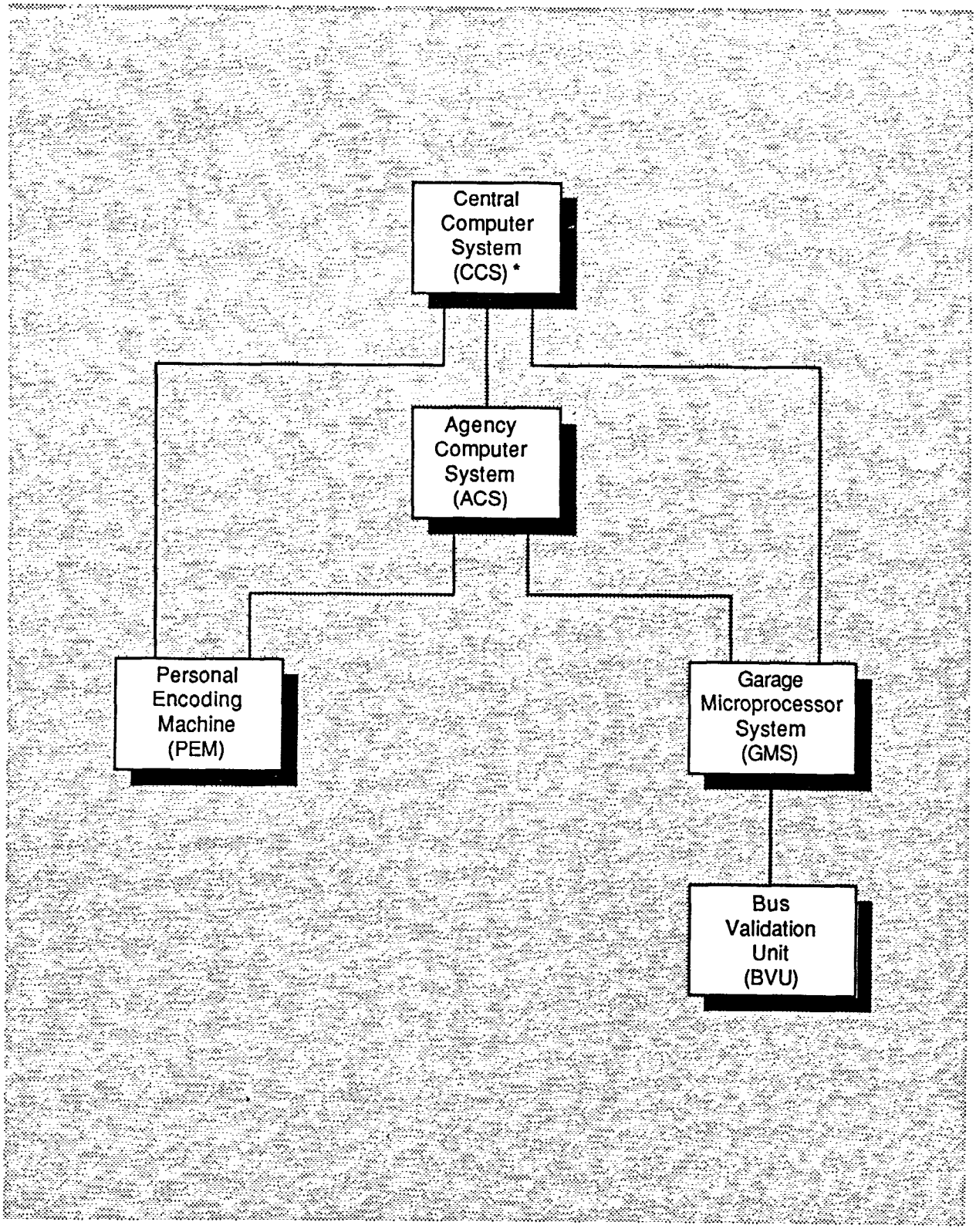
  - the operator permits the transaction by overriding the BVU;
  - the operator denies the transaction and returns the Metrocard to the passenger; or
  - the operator denies the transaction and instructs the BVU to deduct the full fare.

Although the current alternatives are limited, the expansion of the program to additional operators in the future will create more trip alternatives, including more possibilities for multi-operator trips. The benefits to passengers will be the simplicity of using a single instrument in making trips that would otherwise be complicated in a non-integrated fare collection environment.

Data Collection and Reporting System

The data collection and reporting system is the same for all three participants in the Metrocard Program. As shown in the diagram illustrating the data collection and reporting system for Metrocard (Exhibit II-3), there are five components to this system: the personal

Exhibit II-3
Metrocard Data Collection and Reporting System



* *Central Computer System located at Foothill Transit*

encoding machines (PEM), the bus validation units (BVU), the garage microprocessor system (GMS), the agency computer system (ACS) and the central computer system (CCS). Each of these is described below.

Personal Encoding Machines (PEM) - As discussed previously, the PEMs are used by the sales agents to issue and add value to Metrocards. Each PEM is equipped with a hard disk drive that stores the transaction information. This information is uploaded to the agency computer system (ACS) and the central computer system (CCS) via modem. The ACS and CCS computers call the PEMs hourly to extract the transaction data.

Bus Validation Units (BVU) - The BVUs are equipped with a data storage unit that can store up to 2,000 transaction records of 200 bits each. Each BVU also has a data port. Data are extracted through this port via an optical probe to the garage microprocessor system (GMS).

Garage Microprocessor System (GMS) - The GMS includes data probes. The probes are installed at each service lane at the maintenance facility of the three participating transit systems. The probes are used to extract transaction data from the BVUs. Once extracted, the data are stored on the GMS's hard disk drive. As with the PEMs, the GMSs are called hourly by the ACS and CCS computers. The ACS and CCS computers extract all data transaction information stored in the GMS.

Each operator also has a Portable Data Unit (PDU), which consists of a data probe and a laptop computer. The PDU is used to extract transaction data from the BVUs away from the garage facility.

Agency Computer System (ACS) - Each agency's ACS transfers data to and from the PEMs and GMSs on an hourly basis. The data that are transferred to the ACS can be reviewed and used to generate reports at the agency level. The ACS also is capable of sending reports to be printed on the GMSs. All log-ins to the ACS are recorded in a Log Report File, which is uploaded with transaction data to the CCS.

Central Computer System (CCS) - The CCS is located at Foothill Transit. This is the central repository for all Metrocard transaction data. The CCS is similar to the ACS in that it calls the PEMs and GMSs hourly to extract transaction data. In addition, the CCS is connected via modem to each ACS. The CCS has special software to process all revenue and ridership data and generate related reports. The CCS also downloads data related to the fare table, invalid Metrocard serial numbers, date and time to the ACSs, PEMs and GMSs in order to provide all components of the reporting structure up-to-date information.

* * * * *

The Metrocard is a stored value fare card that is the size of a credit card, but only half the thickness. Metrocards can be used to pay the bus fare on any one of three participating transit operators in Los Angeles County. Metrocards are available for adult, student, senior and disabled fare categories. A unique feature of the Metrocard is that value can be added to it. Metrocards can be purchased or have value added in any denomination from $5 to $150.

Metrocards are issued to purchasers through Personal Encoding Machines (PEM) controlled by sales agents. When using a Metrocard to board a bus, each Metrocard passenger inserts the card into the Bus Validation Unit (BVU), which is mounted on the farebox. The BVU deducts the appropriate fare, encodes the remaining value on to the card, and records transaction data to the BVU's memory.

Data collected by the BVUs is extracted through data probes to a Garage Microprocessor System (GMS) or Portable Data Unit (PDU). Information extracted by the GMSs and PDUs is uploaded on an hourly basis to an Agency Computer System (ACS). All ACSs, PEMs, and GMSs are connected to a Central Computer System (CCS). The CCS is the central repository of all Metrocard transaction data.

III. METROCARD USER SURVEY

Survey Approach

Though sales information can identify the size of the Metrocard market, no other information was able to explain the characteristics of this market. A survey of Metrocard users was designed to obtain this information. The objectives of the Metrocard user survey were to:

- develop a profile of Metrocard users, including the transit operators they ride on, their ticket purchasing activity, and their travel patterns; and
- obtain information on Metrocard user experiences and opinions about the program.

A survey card was developed, in consultation with LACMTA and each participating operator's staff, to obtain the information described above. The survey consisted of 17 questions. A sample follows as Exhibit III-1. LACMTA had the survey translated into Spanish, so that the resulting form was bilingual. The survey was designed to be handed out on-board Foothill Transit, Montebello Bus Lines and Culver CityBus buses to those paying their fare with a Metrocard. LACMTA distributed the survey to the operators and provided oversight for the entire survey effort.

The surveys were distributed in late January and early February 1995. The survey was designed as a postage paid card. LACMTA provided the postage paid permit for the survey. A total of 157 usable responses were received. All results were processed using the Statistical Product for the Social Sciences (SPSS) PC software. The responses are summarized in the following discussion.

Exhibit III-1
Metrocard User Survey Card

Metrocard

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MA PERMIT NO. 64314 LOS ANGELES,CA 90017

POSTAGE WILL BE PAID BY ADDRESSEE

Larry Torres
METROPOLITAN TRANSPORTATION AUTHORITY
PO BOX 194
LOS ANGELES CA 90053-0194

METROCARD USER SURVEY

Thank You . . .
for using a ***Metrocard***. We appreciate you using public transportation and this new program. Please help us improve the program by taking a few minutes to answer the following questions. Then simply fold the form, seal it with tape, and mail it in, postage free.

If you have already filled out a ***Metrocard*** survey card in the past day or two, please disregard this card. Please do not fill out more than one ***Metrocard*** survey.

1 When did you buy your first ***Metrocard***?

_____ _____
Month *Year*

What was the value of it? $_____

2 Are you still using your first ***Metrocard?***

❑ Yes ❑ No

3 Which ***Metrocard*** did you use today?

❑ Adult
❑ Student
❑ Senior
❑ Disabled

4 How did you pay for this ***Metrocard***? (Check only **one**.)

❑ Cash ❑ Credit card
❑ Check ❑ Bank ATM card
❑ Money Order
❑ Other *(please specify)*

5 Did you use any bus passes and/or tokens on a regular basis before you first purchased a ***Metrocard***?

- ❑ No
- ❑ Yes (Please check **all** that apply)

Other Operator:	**MTA:**
❑ Bus pass	❑ MTA pass
❑ Token	❑ MTA token

❑ Other *(please specify)* _____

Which Operator: _____

6 Do you still use any bus passes and/or tokens on a regular basis?

- ❑ No
- ❑ Yes (Please check **all** that apply)

Other Operator:	**MTA:**
❑ Bus pass	❑ MTA pass
❑ Token	❑ MTA token

❑ Other *(please specify)* _____

Which Operator: _____

7 Which transit services do you use with your ***Metrocard***? (Check only one per row.)

	Frequently	Sometimes	Never
Culver Citybus	❑	❑	❑
Foothill Transit	❑	❑	❑
Montebello Transit	❑	❑	❑

8 How often do you use any other transit services? (Check only **one** per row.)

	Frequently	Sometimes	Never
MTA Bus	❑	❑	❑
MTA Rail	❑	❑	❑
Metrolink	❑	❑	❑
Santa Monica Bus	❑	❑	❑
Commuter Express	❑	❑	❑
DASH	❑	❑	❑
Torrance Transit	❑	❑	❑
Others (please list)			
_____	❑	❑	❑
_____	❑	❑	❑

9 How many days this week will you use your ***Metrocard*** for the following types of trips? (Check only **one** in each row.)

	Days per week			
	4 to 5 or more	2 to 3	1 or less	Never
Commuting: work	❑	❑	❑	❑
Commuting: school	❑	❑	❑	❑
Shopping/social/recreation	❑	❑	❑	❑
Personal business or medical	❑	❑	❑	❑
Other	❑	❑	❑	❑

10 Which days this week have you or will you use your ***Metrocard***? (Check **all** that apply.)

❑ Mon ❑ Tues ❑ Wed ❑ Thurs
❑ Fri ❑ Sat ❑ Sun

11 Have you added value to your original ***Metrocard***?

❑ Yes ❑ No

If yes:
How many times? _____
How much value do you usually add each time
$_____

12 Has using a ***Metrocard*** changed how often you use transit? (Check only **one** per service.)

	Culver Citybus	Foothill Transit	Montebello Transit
Use more than before	❑	❑	❑
Use about the same	❑	❑	❑
Use less than before	❑	❑	❑
Did not use before	❑	❑	❑

13 Have you experienced any of the following situations? (Check only one per row)

	Frequently	Sometimes	Never
Card jammed in machine	❑	❑	❑
Machine read inaccurate amount	❑	❑	❑
Machine rejected card	❑	❑	❑
Unable to read print on card	❑	❑	❑
Needed a replacement card	❑	❑	❑

14 Rate the importance of the following reasons for your using ***Metrocard***. (Check only one per row)

	Very Important	Important	Somewhat Important	Not Important
Overall discount (saves money)	❑	❑	❑	❑
Ability to use on multiple systems	❑	❑	❑	❑
Two year expiration date	❑	❑	❑	❑
Ability to buy a high face value card	❑	❑	❑	❑
Ability to add value to card	❑	❑	❑	❑
Don't have to carry cash	❑	❑	❑	❑
Other_____ (Specify)	❑	❑	❑	❑

15 Overall, how satisfied are you with ***Metrocard***?

❑ Very satisfied ❑ Dissatisfied
❑ Satisfied ❑ Very dissatisfied

16 Considering all aspects of ***Metrocard***, do you think that it's a good idea to continue this program?

- ❑ Yes, continue as is.
- ❑ Yes, continue it, but change_____
- ❑ No, do not continue_____

17 Would you use ***Metrocard*** more often, if it were discounted?

❑ Yes ❑ No

Please fold and seal with tape before mailing. Thank you!

Length of Time Using Metrocard

Except for a small group of riders that assisted with the preliminary test of the equipment, most riders were first able to purchase Metrocards when the program was introduced to the public, in April 1994. According to the responses to the survey, the entry into the program peaked between July 1994 and September 1994.

When did you buy your first Metrocard ticket?

Response	Frequency	*Percentage*	*Cumulative*
Apr.-June 1994	14	*13*	*13*
July-Sept. 1994	41	*39*	*52*
Oct.-Dec. 1994	36	*34*	*86*
Jan. 1995	15	*14*	*100*
TOTAL	106	*100*	

The majority of respondents had been using a Metrocard for more than six months at the time of the survey. As shown above, entry into the program appears to have grown slowly, suggesting that the market still has the potential to increase.

Metrocard Type and Purchasing

A Metrocard can be purchased for denominations from $5.00 and up. The survey found that the majority of riders placed between $10 and $25 on their first Metrocard. Relatively few riders purchased their first Metrocard for under $10.

What was the value of your first Metrocard ticket?

Response	Frequency	*Percentage*
Under $10	10	*7*
$10 to $25	49	*35*
$26 to $50	32	*23*
$51 to $75	27	*19*
More than $75	23	*16*
TOTAL	141	*100*

When asked if they were still using their first Metrocard, the majority (53 percent) of the respondents indicated that they were not. To some extent, this may reflect changes in the card stock used in the program. Initially, Metrocards were paper stock and did not perform to expectations. The paper Metrocards tore easily and needed frequent replacement. Nonetheless, 47 percent of the respondents indicated that they were still using their first Metrocard. Considering that a similar percentage also purchased their first Metrocard in late 1994 and early 1995, this is not surprising.

More than 83 percent of survey respondents indicated that they were using an Adult Metrocard. The next largest group (7 percent) were using Student Metrocards. The remaining 10 percent were the two categories of Senior and Disabled Metrocard users. Each of these groups represented five percent of the survey respondents.

Users also were asked how they paid for their Metrocard. Nearly 80 percent of the Metrocard users purchased their card with either cash or check. Of the three operators, only Foothill Transit offers payment by credit card. Credit card sales represented 10 percent of all Metrocard purchases.

How did you pay for this Metrocard?

Response	Frequency	*Percentage*
Cash	66	*48*
Check	44	*32*
Credit Card	14	*10*
Transit Check	5	*4*
Employer Subsidy	4	*3*
Money Order	2	*
Other	3	*2*
TOTAL	138	*100*

* = *Less than two percent*

A related question asked users whether they have added value to their original Metrocard. Many (62 percent) of the respondents had added value to their original Metrocard. Of these, 60 percent indicated that they added value three times or less; an additional 36 percent indicated that they had added value to their Metrocard between four and 10 times. Four (4) percent of the respondents indicated that they added value more than 10 times.

When adding value, most Metrocard users (73 percent) said they added between $10 and $50 to their Metrocard each time. Very few Metrocard users (3 percent) said they added less than $10 in value. Another 24 percent of Metrocard users indicated that they added more than $50 each time. Based on the findings from the survey, Metrocard users are adding an average of $43 each time they add value to their card.

Use of Other Prepaid Media

Metrocard complemented or replaced other multiple-ride passes and tickets offered by the operators at the time the program was introduced. Metrocard users were asked to identify any tickets they were using prior to Metrocard and any they were continuing to use. The local operators' bus passes were used by 29 percent of the survey respondents. Another 16 percent indicated that they used an MTA pass prior to the Metrocard program. Only 9 percent of the respondents indicated that they still used these bus passes while 11 percent indicated that they still used an MTA pass. Responses requiring all remaining media also show a reduction in use since the Metrocard program was instituted. These results are shown below:

Did you use any bus passes and/or tokens on a regular basis before you first purchased a Metrocard?

Do you still use any bus passes and/or tokens on a regular basis?

Type of Ticket	Used Before	Still Use
Operator Bus Pass	29%	9%
MTA Pass	16%	11%
Token	11%	4%
MTA Token	9%	8%
Other	3%	2%
TOTAL CASES	76	43

Note: Question permitted multiple responses. Total cases is the number of surveys with at least one response.

Transit Services Used

Currently, Metrocard is accepted on the buses of three different transit operators in Los Angeles County. The ability to use one instrument for a trip involving multiple operators

is a key feature of the Metrocard program. Users were asked how often they expected to use their Metrocard on Foothill Transit, Montebello Bus Lines, and Culver CityBus. As shown below, most respondents (52 percent) were users of Foothill Transit. Users of Montebello Bus Lines and Culver CityBus services accounted for 21 and 27 percent of the respondents, respectively.

Which transit services will you use with your Metrocard?

Response	Fre-	*Percentage*
Foothill Transit		
Frequently	68	*45*
Sometimes	10	*7*
Cases	78	*52*
Montebello Bus Lines		
Frequently	28	*19*
Sometimes	4	*3*
Cases	32	*21*
Culver CityBus		
Frequently	35	*23*
Sometimes	5	*3*
Cases	40	*27*
Total Cases	150	*100*

Several major transit operators in Los Angeles County are not in the Metrocard program yet. This lack of options during the demonstration phase may be inhibiting the public's receptiveness to Metrocard. To understand the interoperator travel patterns of current users, a question was asked about how often they used the services of seven other transit operators. The responses, summarized below, show a strong tendency to ride MTA buses, the major regional operator, as well as two other municipal fixed-route services, DASH and Santa Monica Bus:

How often do you use the following transit services?

Response	Frequency	*Percentage*
MTA Bus	67	*35*
DASH	43	*22*
Santa Monica Bus	33	*17*
Metrolink	19	*10*
MTA Rail	15	*8*
Commuter Express	8	*4*
Torrance Transit	3	*2*
Gardena	2	*1*
Metro Access	2	*1*
Omnitrans	2	*1*
Total Cases	194	*100*

Question permitted multiple responses. Total cases=surveys with at least one response.

These responses reflect the geographic location and travel patterns of those in the survey. It is important to recognize that these responses represent the propensity only of those now buying Metrocards. It is not an assessment of the overall market for Metrocard.

Trip Purposes

Metrocards are being used primarily for the daily commute to work. More than 77 percent of respondents answered that they expected to use their Metrocard four or more days in the next week for a work trip. Another 14 percent said they would use it for work trips on two to three days of the next week. As shown below, Metrocards also are used for occasional shopping or personal business trips. However, this appears to be incidental to the commute to work trip for which the Metrocard was purchased.

How many days next week will you use your Metrocard for the following types of trips?

Response	Frequency	*Percentage*
Commuting: Work		
4 or more days per week	96	*77*
2 to 3 days per week	17	*14*
1 day or less per week		
Never	11	*9*
Total Cases	124	*100*
Commuting: School		
4 or more days per week	19	*26*
2 to 3 days per week	7	*10*
1 day or less per week	2	*3*
Never	46	*62*
Total Cases	74	*100*

Shopping/Social/Recreation		
4 or more days per week	10	*12*
2 to 3 days per week	16	*19*
1 day or less per week	26	*31*
Never	32	*38*
Total Cases	84	*100*
Personal Business/Medical		
4 or more days per week	10	*11*
2 to 3 days per week	12	*14*
1 day or less per week	23	*26*
Never	43	*49*
Total Cases	88	*100*

Most of the travel with a Metrocard is done on weekdays. Users were asked which days next week they will use their Metrocard. The responses for the individual weekdays ranged from 76 to 92 percent. A considerable proportion, however, did expect to use their Metrocard on Saturday (33 percent). And 18 percent anticipated Sunday use.

By making transit easier to use, a side benefit of Metrocard could be more trips made on transit. Metrocard purchasers who had used a Metrocard in the past were asked if it had changed how often they used Foothill Transit, Montebello Bus Lines, and Culver CityBus. A noticeable number stated they now were using the services more.

Has using Metrocard changed how often you use transit?

Response	Frequency	*Percentage*
Foothill Transit		
Use more than before	20	*24*
Use about the same	45	*54*
Use less than before	1	*1*
Did not use before	18	*21*
Total Cases	84	*100*
Montebello Bus Lines		
Use more than before	13	*26*
Use about the same	15	*29*
Use less than before		
Did not use before	23	*45*
Total Cases	51	*100*
Culver CityBus		
Use more than before	16	*26*
Use about the same	24	*39*
Use less than before	1	*2*
Did not use before	21	*34*
Total Cases	62	*100*

It is important to recognize that these responses reflect the users perceptions of their use of the three transit services over time.

Metrocard Use Experience

The operator staff is aware of reliability issues that arise in the field with the Metrocard equipment. To determine how these situations are perceived by the users, respondents were asked how often they had encountered five different situations:

- card jammed in machine
- machine read inaccurate amount
- machine rejected card
- unable to read print on card
- needed a replacement card

The first three conditions reflect problems with the equipment. The last two condition reflect problems with the Metrocard itself. The responses are summarized below:

Have you experienced any of the following situations?

Response	Frequency	*Percentage*
Card jammed in machine		
Frequently	5	*4*
Sometimes	54	*45*
Never	61	*51*
Total Cases	120	*100*

Machine read inaccurate amount		
Frequently	5	*5*
Sometimes	34	*34*
Never	61	*61*
Total Cases	100	*100*
Machine rejected card		
Frequently	8	*7*
Sometimes	68	*58*
Never	41	*35*
Total Cases	117	*100*
Unable to read print on card		
Frequently	12	*12*
Sometimes	34	*34*
Never	55	*54*
Total Cases	101	*100*
Needed a replacement card		
Frequently	7	*6*
Sometimes	49	*45*
Never	53	*49*
Total Cases	109	*100*

These results indicate that Metrocard users have not experienced a high incidence of equipment reliability problems or problems with the card itself.

Reasons for Using Metrocard

The final questions in the survey asked why passengers used Metrocard, how satisfied they were with the program, whether the program should continue, and whether they would use the card more if it were discounted. Metrocard users were given a list of seven reasons for using Metrocard and were asked to rate them according to their importance. As shown below, the fare integration aspects of the Metrocard, though important, were less of a factor than the Metrocard users' concerns about carrying cash.

Rate the importance of the following reasons for using Metrocard?

Reason	Very Important	Important	Somewhat Important	Not Important
Overall discount (saves money)	43%	25%	20%	28%
Ability to use on multiple systems	17%	28%	43%	63%
Two year expiration date	32%	31%	31%	57%
Ability to buy a high face value card	28%	44%	41%	28%
Ability to add value to card	33%	48%	27%	24%
Don't have to carry cash	89%	19%	10%	
Other	11%	3%		
TOTAL CASES	127	75	49	51

Metrocard users are very satisfied with the program. Sixty-two percent of the respondents said they were very satisfied. Another 35 percent said they were satisfied. Only two percent were dissatisfied; less than one percent were very dissatisfied.

Metrocard users also were asked if the program should be continued. More than two-thirds of the users (68 percent) responded with an unqualified "yes". The remaining 32 percent answered "yes", but suggested improvements, such as expanding it to other transit providers, increasing the number of sales outlets, adding a discount, expanding the hours at sales locations, and printing the remaining value on the card.

The most frequently suggested improvement was to provide a discount for using Metrocard. The last question on the survey is directly related to this suggestion. This question asked respondents if they would use Metrocard more if it were discounted. Eighty-six percent of the respondents indicated that they would use the card more often if it were discounted.

* * * * *

Based on the results of the survey, it appears that Metrocard has been well received by the riding public. Very few have indicated that they have experienced problems related to the reliability of the equipment or with the Metrocards themselves. Furthermore, all of the survey respondents have indicated that they would like to see the program continued in the future.

IV. SALES AND RIDERSHIP

This section describes the sales and use of Metrocards during the monitoring period. It is based on information provided by Foothill Transit, Montebello Bus Lines and Culver CityBus. The following section describes trends in the sales of Metrocards, the revenue generated by Metrocard sales, and trends in transfer activity.

During the monitoring period, neither the LACMTA nor the operators aggressively marketed the Metrocard Program. The MTA and the operators wanted to ensure the reliability of the equipment before pursuing an aggressive marketing campaign. As such, the sales trends of Metrocard represent the technology's attractiveness to users without the benefit of a significant advertising program.

Metrocard Sales Trends

To examine the growth of the Metrocard Program, the trend in sales revenue from Metrocard sales was reviewed for the period from September 1994 through December 1994. The month-to-month trend in Metrocard sales revenue during this time period, presented in Exhibit IV-1, shows that Metrocard sales were consistently within a range of $8,500 to $13,000 per month. Metrocard sales reached a peak of $13,216 in November 1994. This represents increases of 27 percent and 23 percent in October and November, respectively. December sales exhibit a modest decrease. However, the revenue for December was 7 percent greater than it was at the beginning of the monitoring period in September.

The figures presented in Exhibit IV-1 represent Metrocard sales revenue for each of the three operators in the program: Foothill Transit, Montebello Bus Lines and Culver CityBus. The trend for each operator is discussed below:

Exhibit IV–1
Metrocard Sales Revenue

	September	October	November	December	Total	Percent
Foothill Transit	$7,778	$9,914	$12,470	$8,333	$38,495	78.9%
Montebello Bus Lines	$700	$870	$746	$758	$3,075	6.3%
Culver CityBus	$1,791	$2,114	$1,538	$1,776	$7,219	14.8%
Total	$10,269	$12,898	$14,754	$10,867	$48,789	100.0%

Sources: Monthly Summary Reports

- Foothill Transit - Foothill Transit's Metrocard sales dominate the program. Total sales for the monitoring period were $38,495, which were roughly 79 percent of the total. As such, Foothill Transit's sales trend mirrors the trend for total Metrocard sales. Foothill Transit's Metrocard sales peaked at $12,470 in November.

- Montebello Bus Lines - Montebello Bus Lines' Metrocard sales were at their highest level in October 1994. At this time, sales revenue totalled $870. Sales for November and December were $746 and $758, respectively. Overall, Montebello Bus Lines' Metrocard sales totalled $3,075 for the monitoring period.

- Culver CityBus - Culver CityBus' Metrocard sales totalled $7,219 for the monitoring period. This represents nearly 15 percent of all Metrocard sales for the monitoring period. Culver City Bus' Metrocard sales peaked at $2,114 in October 1994.

Metrocard Ridership

Metrocard ridership was also tabulated for the period from September through December 1994. This information was available for two of the operators, Foothill Transit and Culver CityBus. The Metrocard user ridership trends, presented in Exhibit IV-2, show that total Metrocard ridership has increased consistently from September through December. In September, a total of 5,093 rides were taken on these two systems using Metrocard. Over the monitoring period, ridership levels increased 45 percent, reaching a level of 7,364 Metrocard riders in December. The trends for the individual operators are discussed below.

- Foothill Transit - Foothill Transit's Metrocard ridership increased 68 percent over the monitoring period from 3,256 in September to 5,482 in December. As shown in Exhibit IV-2, ridership increased consistently throughout the monitoring period. The single largest monthly increase occurred between September and October.

- Culver CityBus - Culver CityBus' Metrocard ridership experienced an initial increase between September and October 1994. In October Metrocard ridership totalled 2,528 passengers. In November and December, Metrocard ridership returned to levels that were consistent with September's ridership.

Exhibit IV–2
Metrocard Ridership

	September	October	November	December	Total	Percent
Foothill Transit	3,256	4,369	4,988	5,482	18,095	68.5%
Montebello Bus Lines	*(a)*	*(a)*	*(a)*	*(a)*	*(a)*	—
Culver CityBus	1,837	2,528	2,071	1,882	8,318	31.5%
Total	5,093	6,897	7,059	7,364	26,413	100.0%

Sources: Monthly Summary Reports
(a) Not available

Metrocard Transfers

One of the key concepts behind the Metrocard Program is its being a universal fare instrument for the many transit operators in Los Angeles County. Metrocard is designed to allow passengers to make interagency linked trips seamlessly. That is, using only one instrument, passengers can ride various modes and services without the need for a paper transfer or a combination of cash or fare media. The present program is limited to three local transit operators. To understand the extent to which Metrocard users now are taking advantage of the transfer portion of their cards, the trends in Metrocard transfers were examined, also.

Transfer information was provided for two operators only: Foothill Transit and Culver CityBus. This information isolated transfers to another transit system from those transfers made within the operator's own network. The trend in total Metrocard inter-agency transfers is presented in Exhibit IV-3. Inter-agency transfers as a percentage of ridership is presented in Exhibit IV-4.

Between September and December, Metrocard transfers increased from 389 to 441, respectively. As a percentage of Metrocard ridership, inter-agency transfers made during the monitoring period represent nearly seven percent of Foothill Transit and Culver CityBus Metrocard trips, combined. The trends for the individual operators are discussed below.

- Foothill Transit - It appears that the frequency of inter-agency transfers from Foothill Transit to other operators has increased over the monitoring period. Inter-agency transfers increased 112 percent from 111 in September to 235 in December. As a percentage of ridership, Foothill Transit's inter-agency transfers represent approximately 4 percent of all trips. Monthly inter-agency transfers range from about 2 to more than 5 percent of Metrocard trips.

- Culver CityBus - Culver CityBus' inter-agency transfers remained consistent throughout the monitoring period. Between September and December inter-agency transfers stayed within a range from 200 to 300. Inter-agency transfers represented a considerable proportion of trips on

Exhibit IV–3
Metrocard Inter-Agency Transfers

	September	October	November	December	Total	Percent
Foothill Transit	111	92	268	235	706	40.5%
Montebello Bus Lines	*(a)*	*(a)*	*(a)*	*(a)*	*(a)*	—
Culver CityBus	278	291	264	206	1,039	59.5%
Total	389	383	532	441	1,745	100.0%

Sources: Monthly Summary Reports
(a) Not available

Exhibit IV–4
Metrocard Inter–Agency Transfers as a Percentage of Ridership

	September	October	November	December	Total
Foothill Transit	3.4%	2.1%	5.4%	4.3%	3.9%
Montebello Bus Lines	*(a)*	*(a)*	*(a)*	*(a)*	*(a)*
Culver CityBus	15.1%	11.5%	12.7%	10.9%	12.5%
Total	7.6%	5.6%	7.5%	6.0%	6.6%

Sources: Monthly Summary Reports
(a) Not available

Culver CityBus. Monthly inter-agency transfers ranged from a low of 11 percent in December to a high of 15 percent in September. Overall, inter-agency transfers represented nearly 13 percent of all Metrocard trips made on Culver CityBus buses.

* * * * *

The trends in Metrocard sales and ridership indicate that the riding public has been very receptive to the Metrocard Program. Metrocard sales exhibited an overall increase during the monitoring period despite a decline between November and December 1994. Furthermore, Metrocard ridership increased consistently from September 1994 through December 1994.

V. EQUIPMENT RELIABILITY

Important to the proper functioning of the Metrocard program is the reliability of the equipment. In response to this issue LACMTA, GFI Genfare (the equipment vendor), and the participating operators developed the Reliability, Maintainability and Accuracy Test (RMAT). This section presents a description of the RMAT plan and a discussion of the RMAT results. It is recognized that any introduction of new technology can involve start-up problems. The purpose of this discussion is to highlight the types of problems that have occurred within the Metrocard program and their magnitude. It is not intended to dissuade others from implementing similar innovations.

RMAT Plan

The overall objectives for the RMAT are to ensure that all equipment (i.e., BVUs, OCUs, PEMs and support systems) is installed properly and meets the required degree of reliability and accuracy as well as all data reporting requirements. The detailed objectives of the RMAT are presented in Exhibit V-1.

The RMAT was designed to test all components of the Metrocard program at all three participants' locations. Essentially, two separate tests comprised the RMAT.

- Accuracy Test - This test was conducted to ensure that the amounts deducted by the BVU equipment match the amounts reported at the agency level. The accuracy test requirements were 99.5 percent after 30 days of the start of RMAT and 99.8 percent after 60 days.

- Reliability Test - This test was conducted to identify any hardware/software operating problems, malfunctions and operating failures. Once noted, each incident was categorized into one of five areas:

Exhibit V-1
RMAT Test Plan Objectives

- To install and operate the OCUs, the BVUs on buses which will be placed in revenue service operations at each of the three designated agency locations.
- To install and operate the PEMs at the designated agency sales locations for the sale and/or upgrade of Metrocards.
- To determine if there are any design, manufacturing and/or material defects which would impair the successful use of the equipment in full revenue service.
- To determine the degree of accuracy of the equipment and support system equipment and configuration as indicated and defined herein.
- To determine the degree of reliability of the equipment and support system equipment and configuration as indicated and defined herein.
- To ascertain that the above accuracy and reliability meets the stated requirements.
- To identify the various types of failure modes and determine the required remedial actions required to restore the equipment.
- To document the reporting of problems and failures so that remedial actions may be developed and taken.
- To confirm that the data being probed from a BVU and reported through the ACS and CCS is correct and correlates with the actual events and amounts generated in the course of service.
- To confirm that the data reporting systems at each level of implementation is functioning properly relative to hardware, software and firmware.
- To establish a specific end point for the equipment testing for purposes of contract payment and conclusion.

- Problem - Situations that could be corrected by any means not specifically requiring repair of the equipment.

- Malfunction - Any equipment or software condition occurring on a random basis that results in a non-restoring or permanent state in which the equipment operates in a degraded or atypical mode of performance or not at all. Malfunctions do not involve a failure of mechanical, electrical or electronic components.

- Hard Operating Failure - Any condition that results in a non-restoring, permanent failure of the equipment to perform all of its intended functions in an acceptable manner.

- Soft Operating Failure - Any condition involving the failure of components that does not affect the operation of the equipment and its ability to perform its primary functions.

- Manufacturing Failure - Any material defect or design problem that occurs in ten percent of the equipment.

The results of the reliability test were applied to a set of performance criteria. These data determined whether the equipment passed or failed this test. The RMAT criteria are presented in Exhibit V-2.

Failure Determination - A Failure Review Board (FRB) was established as part of this effort. The FRB's members include representative from LACMTA, GFI, and each of the participating operators. The FRB's responsibilities include the following:

. to ascertain which failures constitute chargeable failures and determine what corrective actions are required to prevent the recurrence of such failures; and

. to determine at the conclusion of the RMAT that the equipment as provided by GFI has or has not passed the test.

Failures to be reported during the RMAT fall into two categories: relevant failures and non-relevant failures. Relevant failures are those that the FRB has determined to be chargeable. This includes any malfunction that prevents the proper use and processing of Metrocards, does not provide required information to the driver/passenger, and results in the loss or corruption

Exhibit V-2
RMAT Performance Criteria

Failure Type	Total Number of Allowable Occurrences During the 60 Day RMAT Period		
	Class I	Class II	Class III
Operating Malfunctions			
Debitcard Validator	0–6	7–11	12 and up
Agency Computer System	0	3	4 and up
Personal Encoding Machine	0–2	3–7	8 and up
Garage Microprocessor System	0	3	4 and up
Central Computer System	0	3	4 and up
Operating Failures			
Debitcard Validator	0–13	14–34	35 and up
Agency Computer System	3	12	13and up
Personal Encoding Machine	0–9	10–25	26 and up
Garage Microprocessor System	3	4–12	13 and up
Central Computer System	3	4–12	13 and up
Manufacturing Failures			
Debitcard Validator	0	0	2 and up
Agency Computer System	0	0	2 and up
Personal Encoding Machine	0	0	2 and up
Garage Microprocessor System	0	0	2 and up
Central Computer System	0	0	2 and up

Notes:

Class I– RMAT test is passed.

Class II– Contractor is required to correct indicated problems and may be retested at the direction of the LACMTA.

Class III– LACMTA may require GFI to repeat part or all of the RMAT.

of data. Relevant failures are included in the calculation of the reliability of the equipment and may be attributed to the following:

- Equipment/Parts Design
- Equipment/Parts Materials
- Equipment/Parts Manufacture
- Equipment/Parts Quality
- Software Errors/Latent Bugs
- Equipment Installation

Non-relevant failures include any that are the result of factors that are external to the equipment that is being tested. Non-relevant failures are not included in the calculation of the reliability of the equipment. Failures that are non-relevant may be attributable to the following:

- Accident or misuse of the equipment
- Unauthorized alteration of the equipment
- Failure to provide a nominal 24 volt DC electrical service to the BVU
- Environmental conditions beyond those specified
- Passenger induced foreign material other than authorized cards and/or severely damaged cards
- Failures caused by improper operation, maintenance and /or repair by parties other than GFI

At the end of the RMAT, the FRB will determine the results of the testing. Each agency's results will be combined to develop a single set of RMAT results.

RMAT Test Results

The RMAT test period was originally scheduled from December 21, 1994 through February 17, 1995. In order to rectify reliability concerns, RMAT was extended to April 14, 1995. In all, over 3,400 Metrocards were processed during the test period.

Due to the reliability problems encountered during the initial phase of the RMAT, the Metrocard Committee decided to suspend formal reporting. This was done to allow GFI time to make the necessary software modifications. As such, testing was suspended from January 25 through February 10, 1995. Testing resumed on February 13 and was extended for 30 days with an option to extend another 30 days if problems persisted. The following are the results of the individual tests.

Accuracy Test - On March 21, 1995 the Metrocard Committee observed that the accuracy of the Metrocard program during the test period was 95.8 percent. The Committee decided to conduct a follow-up test from March 27 to April 14, 1995. The results of the follow-up test indicated that the Accuracy Test results were 99.6 percent, which was considered to be acceptable.

Reliability Test - The reliability testing was completed on April 14, 1995 with the final results indicating that data transactions were performing satisfactorily. As such, the components of the data reporting system (i.e., ACS, PEM, GMS and CCS) successfully passed RMAT. In addition, the Metrocard Committee tabulated the number of Debitcard Validator (DV) operating failures and malfunctions. The results indicated two more operating failures than the minimum required for a Class I rating. Despite the Class II rating for operating failures, the Committee agreed that no further testing of the DVs was required and that the Reliability Test was passed.

VI. CONCLUSIONS AND PROGRAM FUTURE

Conclusions

The following are the conclusions from this evaluation of the Metrocard Program demonstration. They focus on the basic concepts underlying the Metrocard Program, user acceptance, the reliability and accuracy of the Metrocard equipment and support systems, and the institutional arrangements for the Metrocard Program.

Conceptual Framework

- The Metrocard demonstration has shown that this technology is workable in a bus transit environment. Metrocard technology has not impeded operators from carrying out their day-to-day revenue collection duties.

- The Metrocard technology has proven its capability to collect transaction and ridership data for the individual participants in the program.

User Acceptance

- All Metrocard users appear to be satisfied with the program. One-hundred percent of the survey respondents indicated that they would like the Metrocard Program to continue.

- Metrocard ridership increased during the monitoring period, from September through December 1994, without the benefit of any aggressive marketing program. In addition, passengers accepted the Metrocard even though it offered no discount over the cash fare. These two points demonstrate the attractiveness of the stored-value fare card technology to the riding public.

Accuracy and Reliability

- Very few survey respondents indicated problems with the reliability of the Metrocard equipment or with the Metrocard itself.

- The accuracy and reliability of the Metrocard Program has been demonstrated through its successful completion of the RMAT. During the test period the accuracy of the equipment was shown to be nearly 99.6 percent.

- Despite a Class II rating for the DV operating failures, the Metrocard committee determined that there was no pattern of failures shown that required additional testing or corrective actions.

Institutional Responsibilities

- Implementation of the Metrocard Program has resulted in minimal impacts on the day-to-day activities of the participating operators. Only Foothill Transit added personnel to accommodate the additional responsibilities associated with the Metrocard Program. Montebello Bus Lines and Culver CityBus personnel involved with the program performed their Metrocard duties in addition to their other responsibilities.

- Given the current environment in which Metrocard is used, there is no clear indication of how well the revenue distribution and inter-operator data collection functions of Central Clearinghouse will operate. At this stage of its implementation, these functions are untested.

Metrocard Program Future

The Metrocard Program has emerged successfully from the first stage of the demonstration. Each of the three operators currently participating in the Metrocard Program has indicated that it will continue its involvement with the program through the next stages of its development. The second stage of the Metrocard Program is expected to include the following:

- Electronic transferring equipment will be installed on the buses of the participating operators. It is expected that an additional testing for 30 days will be conducted in order to determine the capability of this new equipment.

- A list of software modifications developed by the contractor and the participating agencies will be addressed as part of the second stage. These modifications will provide additional useable data for the operators.

- A Central Clearinghouse function will be developed as a part of the second stage. Associated with this will be the need to develop administrative and financial policies and procedures to address revenue distribution and interagency data collection. Although these functions are available in the Metrocard software, they have yet to be tested.

The MTA is committed to developing a seamless fare collection system for all operators and modes in Los Angeles County. MTA plans to develop a multi-year plan to integrate rail, parking and other transportation related systems into a county-wide program. MTA is currently reviewing several technology options including proximity cards, smart cards and VISA telephone cards.