GENERAL PLANNING CONSULTANT:

TECHNICAL MEMORANDUM 5.1.2

SPECIFICATION OF THE BUS OPERATING COST MODEL

Prepared for:

Southern California Rapid Transit District

Prepared by:

Barton-Aschman Associates, Inc.

in association with
Schimpeler-Corradino Associates
Cordoba Corporation
Myra L. Frank & Associates
Robert J. Harmon & Associates
Manuel Padron
The Planning Group, Inc.

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Introduction

This report describes the bus operating cost model developed for use in the cash flow analysis for long-term planning at the Southern California Rapid Transit District (SCRTD). It discusses the structure of the model and the sources of data used as input to its specification.

The bus model is designed to compute annual operating expenses for bus operations associated with alternatives evaluated in both base year and inflated dollars. The model generates these estimates from projections of annual bus operating statistics based upon the quantity of service derived from the demand forecasts for each alternative evaluated.

The bus operating costs are sensitive to level of service measures such as annual vehicle-miles, annual service-hours, peak vehicle requirements, and the quantity of service utilized (i.e., passengers). The major assumption underlying this model is that the SCRTD will be the operator of bus service provided.

Overview of the Cost Model Structure

A fixed/variable cost allocation model was selected for use. The basic concept underlying this approach relates the cost of service to the resource quantities supplied and used in the service provision. In addition, this model approach provides sensitivity to service level changes by classifying costs which may or may not vary with changes in the level of service.

The model is structured to provide detail on incremental costs that would be associated with the use of articulated buses. Existing costs reflect buses currently in the SCRTD fleet and include both standard 40-foot urban coaches and articulted buses. Provision is made to estimate changes in costs associated with the use of articulated buses if plans are formulated to change the current ratio of standard to articulated buses. The experience of SCRTD indicates articulated buses generally cost more to operate in terms of mechanic labor, fuel, and maintenance parts and supplies. The additional capacity provided by articulated buses may, however, provide savings in operating labor if fewer buses are required as a result of their use.

In addition, the model is sensitive to variation in inflation rates over time. The experience of SCRTD and other transit properties indicates that prices of diesel fuel and parts and supplies associated with the maintenance and repair of vehicles will generally inflate at a rate greater or less than the overall Consumer Price Index (CPI), a generally accepted "baseline" rate of inflation.

Input Data Base

The bus operating cost model is structured to reflect the SCRTD organization. It is based on SCRTD departments and specific costs have been used to calibrate the model from actual and projected account expenditures for Fiscal Year (FY) 1984. Both the Annual Budget for FY 1984 and the Revenue and Expense Statement for March, 1984 were used as reference documents for expenditures. In addition, input was received from the appropriate departments on distribution of labor resources. Table 1 provides a summary of the SCRTD chart of accounts and appropriate cost allocation.

Table 1
BUS COST ALLOCATION

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passen-gers	Fixed	Variable	If Variable How?
Board of Directors								
Wages	0			X		X		
Fringes	3			X		X		
Services	76			X		X		
Materials and Supplies	3			X		X		
Utilities	9			X		X		
Miscellaneous Expenses	61			X		X		
General Manager								
Wages	382			X		X		
Fringes	3			X		X		
Services	110			X		X		
Materials and Supplies	10			X		X		
Utilities	9			X		X		
Miscellaneous Expenses	97			X		X		
Office of District Secretary								
Wages	215			X		X		
Fringes	2			X		X		
Services	60			X		X		
Materials and Supplies	9			X		X		
Utilities	0			X		X		
Miscellaneous Expenses	38			X		X		
Legal								
Wages	304			X		X		
Fringes	2			X		X		
Services	242			X		X		
Materials and Supplies	26			X		X		
Utilities	8			X		X		
Miscellaneous Expenses	10			X		X		
Assistant General Manager for Operations								
Wages	233			X		X		
Fringes	2			X		X		
Services	1			X		X		
Materials and Supplies	5			X		X		
Utilities	2			X		X		
Miscellaneous Expenses	17			X		X		
Transportation Operating Divisions								
Wages	4,991			X			X	By 159 Peak Vehicles
Fringes	1,229			X			X	By 159 Peak Vehicles
Operator Wages	126,322	X					X	By 777 Revenue Hours
Operator Fringes	31,534	X					X	By 777 Revenue Hours
Services	3			X			X	By 159 Peak Vehicles
Materials and Supplies	92			X			X	By 159 Peak Vehicles
Utilities	28			X			X	By 159 Peak Vehicles
Miscellaneous Expenses	21			X			X	By 159 Peak Vehicles
Stops and Zones								
Wages	654			X		X		
Fringes	3			X		X		
Services	1			X		X		
Materials and Supplies	127			X		X		

Table 1
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Transportation Services								
Wages	1,303			X		X		
Wages	2,470	X				X		
Wages	529	X					X	By 476,800 Revenue Hours of Service
Fringes	135	X					X	By 476,800 Hours of Service
Wages	873			X		X		
Wages	436			X			X	By 159 Peak Vehicles
Fringes	111			X			X	By 159 Peak Vehicles
Fringes	21			X		X		
Services	13			X		X		
Materials and Supplies	24			X		X		
Utilities	25			X			X	By 159 Peak Vehicles
Utilities	51			X		X		
Miscellaneous Expenses	4			X		X		
Transportation Instruction								
Wages	2,553			X			X	By 172 Peak Vehicles
Fringes	580			X			X	By 172 Peak Vehicles
Wages	209			X		X		
Wages	564	X					X	By 447,000 Hours of Service
Fringes	144	X					X	By 447,000 Hours of Service
Fringes	15			X		X		
Services	1			X		X		
Materials and Supplies	26			X		X		
Utilities	1			X		X		
Miscellaneous Expenses	3			X		X		
Transportation General								
Wages	737	X				X		
Fringes	40	X				X		
Services	5	X				X		
Materials and Supplies	701	X				X		
Utilities	150	X				X		
Miscellaneous Expenses	27	X				X		
Maintenance Operating Divisions								
Servicing Deep Clean Wages	1,441			X			X	By 32 Peak Vehicles
Servicing Deep Clean Fringes	372			X			X	By 32 Peak Vehicles
Servicing Wages	8,163			X			X	By 5.6 Peak Vehicles
Servicing Fringes	2,110			X			X	By 5.6 Peak Vehicles
Servicing Supervisor Wages	373			X			X	By 188 Peak Vehicles
Servicing Supervisor Fringes	96			X			X	By 188 Peak Vehicles
Wheelchair Maintenance Wages	1,930			X			X	By 34.4 Peak Vehicles
Wheelchair Maintenance Fringes	429			X			X	By 34.4 Peak Vehicles
Non-Revenue Wages	868	X					X	By 264,889 Hours
Non-Revenue Fringes	193	X					X	By 264,889 Hours
Farebox Maintenance Wages	322			X			X	By 206 Peak Vehicles
Farebox Maintenance Fringes	72			X			X	By 206 Peak Vehicles
Campaigns and Reserve Wages	1,094			X			X	By 60.7 Peak Vehicles
Campaigns and Reserve Fringes	281			X			X	By 60.7 Peak Vehicles
Inspection Wages	2,444		X				X	By 1,251,605 Miles
Inspection Fringes	544		X				X	By 1,251,605 Miles
Running Repair Wages	19,845		X				X	By 154,169 Miles
Running Repair Fringes	4,416		X				X	By 154,169 Miles
Supervision and Administration Wages	4,092			X			X	By 172 Peak Vehicles
Supervision and Administration Fringes	1,008			X			X	By 172 Peak Vehicles

Table 1
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Maintenance Operating Divisions (continued)								
Servicing Wages Fixed	333			X		X		
Servicing Fringes Fixed	86			X		X		
Training and Other Fringe Benefits	378			X			X	By 172 Peak Vehicles
Services for Divisions	248			X			X	By 172 Peak Vehicles
Lubricants Revenue Equipment	1,119		X				X	Directly by Miles
Tires and Tubes Revenue Equipment	4,020		X				X	Directly by Miles
Bus Parts Revenue Equipment	21,620		X				X	Directly by Miles
Tools and Expendable Equipment	764			X			X	By 172 Peak Vehicles
Other Materials and Supplies	1,637			X			X	By 172 Peak Vehicles
Utilities	146			X			X	By 172 Peak Vehicles
Miscellaneous Expenses	40			X			X	By 172 Peak Vehicles
Central Maintenance								
Running Repair Wages	933		X				X	By 3,280,069 Miles
Running Repair Fringes	208		X				X	By 3,280,069 Miles
Engine Rebuild Wages	1,254		X				X	By 2,439,026 Miles
Engine Rebuild Fringes	279		X				X	By 2,439,026 Miles
Transmission Shop Wages	933		X				X	By 3,280,069 Miles
Transmission Shop Fringes	208		X				X	By 3,280,069 Miles
Electrical Shop Wages	1,029		X				X	By 2,972,563 Miles
Electrical Shop Fringes	229		X				X	By 2,972,563 Miles
Small Units Shop Wages	868		X				X	By 3,523,037 Miles
Small Units Shop Fringes	193		X				X	By 3,523,037 Miles
Engine Teardown Wages	322		X				X	By 9,512,200 Miles
Engine Teardown Fringes	72		X				X	By 9,512,200 Miles
Radiator Shop Wages	257		X				X	By 11,890,250 Miles
Radiator Shop Fringes	57		X				X	By 11,890,250 Miles
Machine Shop Wages	418		X				X	By 7,317,077 Miles
Machine Shop Fringes	93		X				X	By 7,317,077 Miles
Sheet Metal Shop Wages	386		X				X	By 7,926,833 Miles
Sheet Metal Shop Fringes	86		X				X	By 7,926,833 Miles
Welding Shop Wages	450		X				X	By 6,794,429 Miles
Welding Shop Fringes	100		X				X	By 6,794,429 Miles
Upholstery Shop Wages	482		X				X	By 6,341,467 Miles
Upholstery Shop Fringes	107		X				X	By 6,341,467 Miles
Paint and Trim Shop Wages	1,319		X				X	By 2,320,049 Miles
Paint and Trim Shop Fringes	295		X				X	By 2,320,049 Miles
Body and Frame Shop Wages	2,091		X				X	By 1,463,415 Miles
Body and Frame Shop Fringes	465		X				X	By 1,463,415 Miles
Miscellaneous Repair Shop Wages	322		X				X	By 31,707,333 Miles
Miscellaneous Repair Shop Fringes	72		X				X	By 31,707,333 Miles
Service Wages	378			X			X	By 121 Peak Vehicles
Service Fringes	98			X			X	By 121 Peak Vehicles
Central Shop Supervision Wages	843			X			X	By 138 Peak Vehicles
Central Shop Supervision Fringes	207			X			X	By 138 Peak Vehicles
Central Shop Administration Wages	369			X		X		
Training and Other Fringes	113			X		X		
Services	338			X		X		
Utilities	3			X		X		
Miscellaneous Expenses	14			X		X		

Table 1
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Facilities Maintenance Department								
Electrical Maintenance Wages	740			X			X	By 147 Peak Vehicles
Electrical Maintenance Fringes	165			X			X	By 147 Peak Vehicles
Property Maintenance Wages	1,801			X			X	By 147 Peak Vehicles
Property Maintenance Fringes	411			X			X	By 147 Peak Vehicles
Administration and Supervision Wages	500			X		X		
Training and Fringe Benefits	49			X		X		
Services	61			X		X		
Materials and Supplies	2,016			X			X	By 147 Peak Vehicles
Utilities	1			X		X		
Miscellaneous Expenses	16			X		X		
Maintenance General Department								
Instruction Wages	444			X			X	By 188 Peak Vehicles
Instruction Fringes	109			X			X	By 188 Peak Vehicles
Wages	1,647			X		X		
Fringes	36			X		X		
Services	315			X		X		
Materials and Supplies	44			X		X		
Utilities	130			X		X		
Miscellaneous Expenses	71			X		X		
Equipment Engineering Department								
Wages	765			X		X		
Fringes	5			X		X		
Services	152			X		X		
Materials and Supplies	41			X		X		
Utilities	14			X		X		
Miscellaneous Expenses	3			X		X		
Telecommunications Department								
Electronic Maintenance Wages	1,190			X			X	By 56 Peak Vehicles
Electronic Maintenance Fringes	265			X			X	By 56 Peak Vehicles
Administration Wages	1,404			X		X		
Fringes	16			X		X		
Services	88			X		X		
Materials and Supplies Revenue Equipment	163			X			X	Directly by Peak Vehicles
Materials and Supplies	361			X		X		
Utilities	24			X		X		
Miscellaneous Expenses	19			X		X		
Safety Department								
Wages	226			X		X		
Fringes	4			X		X		
Services	92			X		X		
Materials and Supplies	67			X		X		
Utilities	3			X		X		
Miscellaneous Expenses	33			X		X		

Table 1
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passen-gers	Fixed	Variable	If Variable How?
Transit Police Department								
Police Wages	976				X		X	By 13,688,235 Passengers
Police Fringes	268				X		X	By 13,688,235 Passengers
Police Wages	488	X					X	By 420,706 Hours
Police Wages	134	X					X	By 420,706 Hours
Administrative Wages	2,198			X		X		
Fringes	90			X		X		
Services	349			X		X		
Materials and Supplies	59			X		X		
Utilities	32			X		X		
Miscellaneous Expenses	36			X		X		
Scheduling Department								
Schedule Maker Wages	288	X					X	By 596,000 Hours
Schedule Maker Fringes	73	X					X	By 596,000 Hours
Checker Wages	1,224			X			X	By 40.5 Peak Vehicles
Checker Fringes	309			X			X	By 40.5 Peak Vehicles
Wages	1,685			X		X		
Fringes	4			X		X		
Services	7			X		X		
Materials and Supplies	33			X		X		
Utilities	17			X		X		
Miscellaneous Expenses	80			X		X		
Assistant General Manager for Planning and Communications								
Wages	114			X		X		
Fringes	1			X		X		
Services	1			X		X		
Materials and Supplies	1			X		X		
Utilities	1			X		X		
Miscellaneous Expenses	2			X		X		
Planning								
Wages	1,419			X		X		
Fringes	7			X		X		
Services	1,243			X		X		
Materials and Supplies	106			X		X		
Utilities	51			X		X		
Miscellaneous Expenses	101			X		X		
Marketing and Communications								
Ticket Clerk Wages	529				X		X	By 21,154,545 Passengers
Ticket Clerk Fringes	116				X		X	By 21,154,545 Passengers
Wages	1,490				X	X		
Fringes	20				X	X		
Services	404				X	X		
Materials and Supplies	800				X	X		
Utilities	41				X	X		
Miscellaneous Expenses	166				X	X		

Table 1
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passen-gers	Fixed	Variable	If Variable How?
Customer Relations								
Telephone Clerks Wages	2,159				X		X	By 4,951,064 Passengers
Telephone Clerks Fringes	483				X		X	By 4,951,064 Passengers
Wages	904				X	X		
Fringes	4				X	X		
Services	42				X	X		
Materials and Supplies	20				X	X		
Utilities	158				X	X		
Miscellaneous Expenses	29				X	X		
Assistant General Manager for Government and Community Affairs								
Wages	95			X		X		
Materials and Supplies	1			X		X		
Utilities	1			X		X		
Miscellaneous Expenses	5			X		X		
Government Affairs								
Wages	229			X		X		
Fringes	3			X		X		
Services	75			X		X		
Materials and Supplies	2			X		X		
Utilities	17			X		X		
Miscellaneous Expenses	36			X		X		
Community Relations								
Wages	328			X		X		
Fringes	4			X		X		
Services	33			X		X		
Materials and Supplies	30			X		X		
Utilities	7			X		X		
Miscellaneous Expenses	48			X		X		
Assistant General Manager for Equal Opportunity								
Wages	95			X		X		
Materials and Supplies	1			X		X		
Utilities	1			X		X		
Miscellaneous Expenses	5			X		X		
Human Relations								
Wages	249			X		X		
Fringes	2			X		X		
Services	3			X		X		
Materials and Supplies	4			X		X		
Utilities	6			X		X		
Miscellaneous Expenses	11			X		X		
Employee Education, Training, and Development								
Wages	958			X		X		
Fringes	294			X		X		
Services	66			X		X		
Materials and Supplies	6			X		X		
Utilities	9			X		X		
Miscellaneous Expenses	26			X		X		

Table 1
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Controller-Treasurer-Auditor								
Wages	280			X		X		
Fringes	3			X		X		
Services	400			X		X		
Materials and Supplies	7			X		X		
Utilities	14			X		X		
Miscellaneous Expenses	36			X		X		
Accounting and Fiscal								
Payroll Clerk Wages	370	X					X	By 447,000 Hours
Payroll Clerk Fringes	83	X					X	By 447,000 Hours
Cash Clerk Wages	673				X		X	By 16,621,429 Passengers
Cash Clerk Fringes	148				X		X	By 16,621,429 Passengers
Wages	1,852			X		X		
Fringes	15			X		X		
Services	275			X		X		
Materials and Supplies	86			X		X		
Utilities	21			X		X		
Miscellaneous Expenses	16			X		X		
Data Processing								
Wages	2,863			X		X		
Fringes	76			X		X		
Services	2,099			X		X		
Materials and Supplies	316			X		X		
Utilities	46			X		X		
Miscellaneous Expenses	80			X		X		
Insurance								
Wages	212			X		X		
Fringes	19			X		X		
Services	121			X		X		
Materials and Supplies	15			X		X		
Utilities	5			X		X		
Miscellaneous Expenses	6			X		X		
Assistant General Manager for Transit System Development								
Wages	105			X		X		
Materials and Supplies	1			X		X		
Utilities	1			X		X		
Miscellaneous Expenses	5			X		X		
Bus Facilities Engineering								
Wages	711			X		X		
Fringes	4			X		X		
Services	129			X		X		
Materials and Supplies	25			X		X		
Utilities	11			X		X		
Miscellaneous Expenses	20			X		X		
Assistant General Manager for Management								
Wages	95			X		X		
Materials and Supplies	1			X		X		
Utilities	1			X		X		
Miscellaneous Expenses	5			X		X		

Table 1
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Contracts and Purchasing								
Stores Wages	941			X			X	By 159 Peak Vehicles
Stores Fringes	206			X			X	By 159 Peak Vehicles
Wages	2,969			X		X		
Fringes	39			X		X		
Services	30			X		X		
Materials and Supplies	79			X		X		
Utilities	30			X		X		
Miscellaneous Expenses	61			X		X		
Personnel Department								
Wages	1,429			X		X		
Fringes	7			X		X		
Services	588			X		X		
Materials and Supplies	123			X		X		
Utilities	27			X		X		
Miscellaneous Expenses	55			X		X		
General Services								
Wages	1,396			X		X		
Fringes	3			X		X		
Services	46			X		X		
Materials and Supplies	190			X		X		
Utilities	3			X		X		
Miscellaneous Expenses	3			X		X		
Print Shop								
Wages	750			X		X		
Fringes	5			X		X		
Services	253			X		X		
Timetables	490				X		X	Directly by Passengers
Materials and Supplies	211			X		X		
Utilities	4			X		X		
Miscellaneous Expenses	2			X		X		
Management and Budget								
Wages	522			X		X		
Fringes	4			X		X		
Services	2			X		X		
Materials and Supplies	20			X		X		
Utilities	8			X		X		
Miscellaneous Expenses	7			X		X		
Labor Relations								
Wages	224			X		X		
Fringes	2			X		X		
Services	45			X		X		
Materials and Supplies	7			X		X		
Utilities	2			X		X		
Miscellaneous Expenses	7			X		X		

Table 1
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Employee Activities								
Wages	115			X		X		
Services	72			X		X		
Materials and Supplies	33			X		X		
Utilities	7			X		X		
Miscellaneous Expenses	153			X		X		
Nondepartmental Expenses								
Wages	1,043			X		X		
Fringes	13,463			X		X		
Workmen's Compensation	8,460	X					X	By 777 Hours
Workmen's Compensation	3,254		X				X	By 59,451 Miles
Workmen's Compensation	1,301			X		X		
Services	1,575			X		X		
Fuel	25,858		X				X	Directly by Miles
Materials and Supplies	763			X		X		
Utilities	2,252			X		X		
Premiums for Physical Damage	86			X		X		
Premiums for PL&PD Insurance	27			X		X		
Premiums for Corporate Insurance	20			X		X		
Provisions for Uninsured PL PL	22,615				X		X	By 101,174 Passengers at $4,916 Each
Provisions for Uninsured PD	1,521		X				X	By 39,634 Miles at $634 each
Expenses for PL	2,098				X		X	By 101,174 Passengers at $456 per Step
Expenses for PD	1,094		X				X	By 39,634 Miles at $456 per Step
Fuel and Lube Taxes Non-Revenue Equipment	120	X				X		
Fuel and Lube Taxes Revenue Equipment	1,874		X				X	Directly by Miles
Leases and Rentals	5,851			X			X	
Total:	$425,697							

Model Outline

As indicated above, the model is composed of cost components associated with the SCRTD departments. Costs are related to specific operating characteristics and quantities (i.e., hours, miles, vehicles, and passengers). These relationships are discussed and even though expenses are assumed fixed, they are assigned to a specific operating characteristic or quantity in order to evaluate individual routes. The model definitions and relationships are as follows:

Board of Directors

Wages: These are wages associated with the Board of Directors Department employees. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are training and other fringe benefits allocated to the department employees in the budget. Variable fringe benefits of employees are generally allocated to the non-departmental budget unless otherwise indicated. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: These are costs of services for this department using the chart of accounts for the SCRTD budget. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: These are costs associated with the materials and supplies expenditures of this department as allocated using the chart of accounts for the SCRTD. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are telephone and other utility costs allocated to the department using the SCRTD chart of accounts. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are travel and other allocated expenses for the department using the SCRTD chart of accounts. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

General Manager Department

Wages: These are wages associated with the General Manger Department employees. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are training and other fringe benefits for employees of the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: These are department expenditures for services used by the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: These are costs of materials and supplies for the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are telephone and other utility costs allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are travel and other miscellaneous expenses allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Office of the District Secretary Department

Wages: These are wages associated with the Office of the District Secretary Department employees. They are assumed fixed but are related to peak vehicles for route-cost allocation.

Fringes: These are training and other fringe benefits for employees of the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: These are department expenses for services allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: These are costs of all materials and supplies utilized by the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are expenditures for telephone and other utilities allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are travel and other miscellaneous expenses allocated to the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Legal Department

Wages: These are wages associated with the Legal Department employees. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are training and other fringe benefits for employees of the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: These are the department expenditures for services. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: These are the costs of all materials and supplies utilized by the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are telephone and other utility costs allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are travel and other miscellaneous costs allocated to the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Assistant General Manager for Operations

Wages: These are wages associated with all employees of the Office of the Assistant General Manager for Operations. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are training and other fringe benefits for employees of the this office. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: These are costs for all services allocated to this office. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: These are the costs for all materials and supplies used by the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are costs for telephone and other utilities allocated to the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are travel and other miscellaneous expenses allocated to the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Transportation Operating Divisions

Wages: These are wages associated with the division managers, assistant division managers, dispatchers, and clerical help for each division. Based on 13 operating divisions, these are variable in steps of plus or minus 159 peak vehicles (a representation for one transportation operating division at SCRTD) and are related to peak vehicles for individual route-cost allocation.

Fringes: These are fringe benefits for those employees associated with each transportation operating division. They include fringe benefits that were allocated to the non-departmental budget in the SCRTD budget. These fringes are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Operator Wages: An analysis was accomplished of operator pay-hours and it was determined that over the last year operator pay-hours are 1.5794 times revenue hours of service. Using this as a base and with an estimated 7,152,000 revenue hours for FY 84, a budget was determined for operator pay. These wages are variable in steps of plus or minus 777 revenue hours and are associated with revenue hours for individual route-cost allocation. The 777 revenue hours is the equivalent of one-half of a full-time operator equivalency based on analysis that revealed the average revenue hours per full-time operator is 1,554.

Operator Fringes: These are fringe benefits for bus operators. These were calculated and were previously shown in the non-departmental budget allocation. They are variable in steps of plus or minus 777 revenue hours and are related to revenue-hours for individual route-cost allocation.

Services: These are the costs of services for the Transportation Operating Divisions as allocated with the SCRTD chart of accounts. They are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: These are the costs of materials and supplies associated with the Transportation Operating Divisions. These are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Utilities: These are telephone and other utility costs allocated to the Transportation Operating Divisions. These are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are travel and other miscellaneous expenses associated with the Transportation Operating Divsions. They are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Stops and Zones Department

Wages: These are wages associated with the Stops and Zones Department employees. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are fringe benefits for this department's employees. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services allocated to this department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies for the department. It includes the costs of bus stop signs. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Transportation Services Department

Wages: These are wages of all administrative personnel, managers, supervisors, and assistants in the Transportation Services Department. It also includes wages for traffic loaders and service directors. These wages are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Wages: These are street supervisor wages which are considered fixed. An analysis of the street supervision needs of the SCRTD revealed that there are 85 current positions in the schedule. And an analysis revealed that approximtely 70 of these positions would be considered fixed if coverage of the service area were to remain fairly constant. These wages are assumed fixed but are related to revenue-hours of service for individual route-cost allocation.

Wages: These are wages for the 15 street supervisors that are considered variable. These wages would vary in steps of plus or minus 476,800 revenue-hours of service and are related to revenue-hours for individual route-cost allocation.

Fringes: These are fringe benefits calculated for the 15 street supervisors that are variable by revenue-hours of service. These will vary in steps of plus or minus 476,800 revenue-hours of service and are related to revenue-hours of service for individual route-cost allocation.

Wages: These are wages associated with the radio dispatchers for the SCRTD service area. An analysis was accomplished of the needs for radio dispatchers given cutbacks in service and these wages are associated with those dispatchers which are assumed to be fixed and are related to peak vehicles for individual route-cost allocation.

Wages: These are wages for the radio dispatchers which are considered variable. An analysis revealed that 13 employees could be considered variable depending upon level of service. These wages vary in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Fringes: These are fringe benefits associated with the 13 radio dispatchers. They vary in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Fringes: These are training and other fringe benefits associated with the department. They are considered fixed and are related to peak vehicles for individual route-cost allocation.

Services: These are services related to the Transportation Services Department. They are considered fixed and are allocated to peak vehicles for individual route-cost allocation.

Materials and Supplies: These are materials and supplies expenditures for the department. They are considered fixed but are allocated to peak vehicles for individual route-cost allocation.

Utilities: These are telephone expenses associated with the variable radio dispatch functions. They are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Utilities: These are telephone and other utility costs associated with this department. They are considered fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are travel and other miscellaneous expenses for the department. They are considered fixed but are related to peak vehicles for individual route-cost allocation.

Transportation Instruction Department

Wages: These are wages associated with senior instructors, trainers, and clerk-typists associated with the 12 operating divisions. These wages will vary in steps of plus or minus 172 peak vehicles (a representation of each of the operating divisions) and are related to peak vehicles for individual route-cost allocation.

Fringes: These are fringe benefits associated with those employees attached to the 12 operating divisions. They will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Wages: These are wages associated with the administration of the Transportation Instruction Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Wages: These are the wages of the 16 instructors associated with training incoming bus operators. They will vary in steps of plus or minus 447,000 hours of service and are related to hours of service for individual route-cost allocation.

Fringes: These are fringe benefits associated with the instructors of incoming bus operators and were previously included in the non-departmental allocation. They will vary in steps of plus or minus 447,000 hours of service and are related to hours of service for individual route-cost allocation.

Fringes: These are training and other fringe benefits associated with the Transportation Instruction Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: These are the costs of services allocated to the Transportation Instruction Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: These are the costs of materials and supplies for the Transportation Instruction Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are telephone and other utility expenditures allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are travel and other miscellaneous expenses associated with the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Transportation General

Wages: These are wages of the employees of the administrative arm of the Transportation Department. They are assumed fixed but are related to hours of service for individual route-cost allocation.

Fringes: These are training and other fringe benefits allocated to the Transportation General administrative arm employees. They are assumed fixed but are related to hours of service for individual route-cost allocation.

Services: This is the cost of services provided for the Transportation General. They are assumed fixed but are related to hours of service for individual route-cost allocation.

Materials and Supplies: These are the costs of materials and supplies for the administration of the Transportation Department. They are assumed fixed but are related to hours of service for individual route-cost allocation.

Utilities: This is the telephone and other utility costs allocated to the Transportation Depaartment administrative arm. They are assumed fixed but are related to hours of service for individual route-cost allocation.

Miscellaneous Expenses: These are the costs of travel and other miscellaneous expenses allocated to the administration of the Transportation Department. They are assumed fixed but are related to hours of service for individual route-cost allocation.

Maintenance Operating Divisions

Servicing Deep-cleaning Wages: These are wages associated with the deep-cleaning effort of the bus servicing. It was estimated that 15 percent of the 432 employees assigned to the operating divisions, or 65 employees, were involved in this effort. These wages will vary in steps of plus or minus 32 peak vehicles and are assigned to peak vehicles for individual route-cost allocation.

Servicing Deep-cleaning Fringes: These are the fringe benefits calculated for the 65 employees assigned to the deep-cleaning effort at the Operating Divisions. These costs will vary in steps of plus or minus 32 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Servicing Wages: These are the wages associated with the 367 employees in the Maintenance Operating Divisions assigned to vehicle servicing. These wages will vary in steps of plus or minus 5.6 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Servicing Fringes: These are fringe benefits calculated for the 367 employees assigned this effort at the Maintenance Operating Divisions. These costs will vary in steps of plus or minus 5.6 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Servicing Supervisor Wages: These are the wages associated with the supervision of the bus servicing effort at the Maintenance Operating Division. Based on 11

employees involved in this effort, these costs will vary in steps of plus or minus 188 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Servicing Supervisor Fringes: These are fringe benefits calculated for the 11 supervisors involved in the bus servicing effort. They will vary in steps of plus or minus 188 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Wheelchair Maintenance Wages: These are the wages of the approximately 60 employees assigned to this effort at the Maintenance Operating Divisions. These costs will vary in steps of plus or minus 34.4 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Wheelchair Maintenance Fringes: These are the calculated fringe benefits for the 60 employees involved in the wheelchair maintenance effort at the Maintenance Operating Divisions. They will vary in steps of plus or minus 34.4 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Non-revenue Wages: These are the wages of the 27 mechanics in maintenance of the non-revenue vehicles. They will vary in steps of plus or minus 264,889 hours of service and are related to hours of service for individual route-cost allocation.

Non-revenue Fringes: These are the fringe benefits calculated for the 27 employees assigned to the maintenance of the non-revenue vehicles. They will vary in steps of plus or minus 264,889 hours of service and are related to hours of service for individual route-cost allocation.

Fare Box Maintenance Wages: These are wages associated with the 10 mechanics involved in the farebox maiintenance effort. These costs will vary in steps of plus or minus 206 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Fare Box Maintenance Fringes: These are the fringe benefits calculated for the 10 employees involved in the fare box maintenance effort. They will vary in steps of plus or minus 206 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Campaigns and Reserve Wages: These are the wages associated with the 34 mechanics assigned to campaigns and the reserve fleet of SCRTD. These costs will vary in steps of plus or minus 60.7 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Campaigns and Reserve Fringes: These are the calculated fringe benefits of the 34 employees involved in campaigns and reserve fleet maintenance for the SCRTD. These costs will vary in steps of plus or minus 60.7 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Inspection Wages: These are the wages of the 76 mechanics involved in inspection of buses at the Maintenance Operating Divisions. These wages will vary in steps of plus or minus 1,251,605 miles of service and are related to miles of service for individual route-cost allocation.

Inspection Fringes: These are the calculated fringe benefits of the 76 employees assigned to the inspection effort in the Maintenance Operating Divisions. They will vary in steps of plus or minus 1,251,605 miles of service and are related to miles of service for individual route-cost allocation.

Running Repair Wages: These are the wages associated with the 617 mechanics involved in the running repair effort at the Maintenance Operating Divisions. They will vary in steps of plus or minus 154,169 miles of service and are related to miles of service for individual route-cost allocation.

Running Repair Fringes: These are the calculated fringe benefits for the 617 employees assigned to the running repair effort at the Maintenance Operating Divisions. They will vary in steps of plus or minus 154,169 miles of service and are related to miles of service for individual route-cost allocation.

Supervision and Administration Wages: These are wages associated with the administration and supervision of the Maintenance Operating Divisions. Based on 12 Maintenance Operating Divisions, these costs will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Supervision and Administration Fringes: These are the calculated fringe benefits for those supervisory and administrative employees of the Maintenance Operating Divisions. Based on 12 operating divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Servicing Wages Fixed: These are the wages of the additional servicing employees assigned to campaign and reserve fleet maintenance divisions. These wages are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Servicing Fringes: These are the calculated fringe benefits for those service employees assigned to the campaign and reserve fleet Maintenance Operating Divisions. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Training and Other Fringe Benefits: These are the training and other allocated fringe benefits of the Maintenance Operating Divisions. Based on 12 Operating Divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Services for Divisions: These are the costs of services for the Maintenance Operating Divisions. Based on 12 Maintenance Operating Divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Lubricants Revenue Equipment: This is the cost of lubricants for the Maintenance Operating Divisions. These costs will vary directly by the miles of service and are related to miles of service for individual route-cost allocation.

Tires and Tubes Revenue Equipment: This is the cost of tires and tubes for the revenue equipment. These costs will vary directly by the miles of service provided and are related to miles of service for individual route-cost allocation.

Bus Parts Revenue Equipment: This is the cost of bus parts for the Maintenance Operating Divisions repair effort. These costs will vary directly by the miles of service provided and are related to miles of service for individual route-cost allocation.

Tools and Expendable Equipment: This is the cost of tools and other expendable equipment associated with the Maintenance Operating Divisions. Based on 12 Operating Divisions, these costs will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Other Materials and Supplies: This is the cost of other materials and supplies utilized by the Maintenance Operating Divisions. Based on 12 Operating Divisions, these costs will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities allocated to the Maintenance Operating Divisions. Based on 12 Maintenance Operating Divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses associated with the Maintenance Operating Divisions. Based on 12 Maintenance Operating Divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Central Maintenance

Running Repair Wages: These are wages associated with the 29 employees involved in the running repair effort in the Central Maintenance Facility. These costs will vary in steps of plus or minus 3,280,069 miles and are related to miles for individual route-cost allocation.

Running Repair Fringes: These are the fringe benefits calculated for the 29 mechanics involved in the running repair effort at the Central Maintenance Facility. They will vary in steps of plus or minus 3,280,069 miles and are related to miles for individual route-cost allocation.

Engine Rebuild Wages: These are the wages for the 39 mechanics involved in the engine rebuild effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,439,026 miles and are related to miles for individual route-cost allocation.

Engine Rebuild Fringes: These are the fringe benefits calculated for the 39 mechanics involved in the engine rebuild effort of the Central Maintenance Facility. These costs will vary in steps of plus of minus 2,439,026 miles and are related to miles for individual route-cost allocation.

Transmission Shop Wages: These are the wages for the 29 mechanics involved in the transmission shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 3,280,069 miles and are related to miles for individual route-cost allocation.

Transmission Shop Fringes: These are the fringe benefits calculated for the 29 mechanics involved in the transmission shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 3,280,069 miles and are related to miles for individual route-cost allocation.

Electrical Shop Wages: These are the wages for the 32 mechanics in the electrical shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,972,563 miles and are related to miles for individual route-cost allocation.

Electrical Shop Fringes: These are the fringe benefits for the 32 employees of the electrical shop in the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,972,563 miles and are related to miles for individual route-cost allocation.

Small Unit Shop Wages: These are the wages of the 27 mechanics involved in the small unit shop of the Central Maintenance Facility. These costs wil vary in steps of plus or minus 3,523,037 miles and are related to miles for individual route-cost allocations.

Small Unit Shop Fringes: These are the fringe benefits calculated for the 27 mechanics involved in the small unit shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 3,523,037 miles and are related to miles for individual route-cost allocation.

Engine Teardown Wages: These are wages associated with the 10 mechanics involved in the engine teardown effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 9,512,200 miles and are related to miles for individual route-cost allocation.

Engine Teardown Fringes: These are the fringe benefits calculated for the 10 mechanics involved in the engine teardown effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 9,512,200 miles and are related to miles for individual route-cost allocation.

Radiator Shop Wages: These are the wages associated with the 8 mechanics involved in the radiator shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 11,890,250 miles and are related to miles for individual route-cost allocation.

Radiator Shop Fringes: These are the fringe benefits associated with the 8 employees involved in the radiator shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 11,890,250 miles and are related to miles for individual route-cost allocation.

Machine Shop Wages: These are the wages associated with the 13 mechanics involved in the machine shop effort of the Central Maintenance Facility. These will vary in steps of plus or minus 7,317,077 miles and are related to miles for individual route-cost allocation.

Machine Shop Fringes: These are the fringe benefits calculated for the 13 mechanics involved in the machine shop effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 7,317,077 miles and are related to miles for individual route-cost allocation.

Sheet Metal Shop Wages: These are the wages associated with the 12 mechanics involved in the sheet metal shop of the Central Maintenance Facility. They will vary in steps of plus or minus 7,926,833 miles and are related to miles for individual route-cost allocation.

Sheet Metal Shop Fringes: These are the fringe benefits calculated for the 12 mechanics involved in the sheet metal shop of the Central Maintenance Facility. They will vary in steps of plus or minus 7,926,833 miles and are related to miles for individual route-cost allocation.

Welding Shop Wages: These are the wages associated with the 14 mechanics involved in the welding shop effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 6,794,429 miles and are related to miles for individual route-cost allocation.

Welding Shop Fringes: These are the fringe benefits calculated for the 14 mechanics involved in the welding shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 6,794,429 miles for individual route-cost allocation.

Upholstery Shop Wages: These are the wages associated with the 15 mechanics involved in the upholstery shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 6,341,467 miles and are related to miles for individual route-cost allocation.

Upholstery Shop Fringes: These are the fringe benefits calculated for the 15 mechanics involved in the upholstery shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 6,341,467 miles and are related to miles for individual route-cost allocation.

Paint and Trim Shop Wages: These are the wages associated with the 41 mechanics involved in the paint and trim shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,320,049 and are related to miles for individual route-cost allocation.

Paint and Trim Shop Fringes: These are the fringe benefits calculated for the 41 mechanics involved in the paint and trim shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,320,049 miles and are related to miles for individual route-cost allocation.

Body and Frame Shop Wages: These are the wages assocated with the 65 mechanics involved in the body and frame shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 1,463,415 miles and are related to miles for individual route-cost allocation.

Body and Frame Shop Fringes: These are the fringe benefits calculated for the 65 mechanics involved in the body and frame shop effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 1,463,415 miles and are related to miles for individual route-cost allocation.

Miscellaneous Repair Shop Wages: These are the wages associated with the injector shop, the glass repair shop, and the screen process of the central

maintenance facility. There are a total of 10 employees involved in this effort and approximately one-third are involved with each of these shops. These costs will vary in steps of plus or minus 31,707,333 miles and are related to miles for individual route-cost allocation.

Miscellaneous Repair Shop Fringes: These are the fringe benefits associated with the 10 employees involved in the injector shop, the glass repair shop, and the screen process shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 31,707,333 miles and are related to miles for individual route-cost allocation.

Service Wages: These are the wages associated with the 17 service workers assigned to the Central Maintenance Facility. These costs will vary in steps of plus or minus 121 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Service Fringes: These are the fringe benefits associated with the 17 service workers assigned to the Central Maintenance Facility. These will vary in steps of plus or minus 121 peak vehicles and are assigned to peak vehicles for individual route-cost allocation.

Central Shop's Supervision Wages: These are the wages associated with the supervision in the Central Maintenance Facility. Based on 15 supervisors, these will vary in steps of plus or minus 138 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Central Shop's Supervision Fringes: These are the fringe benefits calculated for the central shop supervision. Based on 15 employees involved in this effort, these will vary in steps of plus or minus 138 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Central Shop's Administration Wages: These are the wages associated with the administration in the Central Maintenance Facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Traning and Other Fringes: These are the costs of training and other fringe benefits associated with the Central Maintenance Facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services associated with the Central Maintenance Facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are telephone and other utility costs allocated to the central maintenance facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are travel and other miscellaneous expenses associated with the Central Maintenance Facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Facility Maintenance Department

Electrical Maintenance Wages: These are the wages associated with the 23 mechanics assigned to electrical maintenance within the Facility Maintenance Department. Based on maintenance for 14 facilities, these will vary in steps of plus or minus 147 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Electrical Maintenance Fringes: These are the fringe benefits calculated for the 23 mechanics assigned to electrical maintenance effort of the Facility Maintenance Department. Based on the maintenance of 14 facilities these will vary in steps of plus or minus 147 peak vehicles and are are related to peak vehicles for individual route-cost allocation.

Property Maintenance Wages: These are the wages associated with the 13 service workers and 47 mechanics assigned to this effort. Based on the maintenance of 14 facilities, these will vary in steps of plus or minus 147 peak vehicles and are are related to peak vehicles for individual route-cost allocation.

Property Maintenance Fringes: These are the fringe benefits calculated for the 13 service workers and 47 mechanics assigned to the property maintenance effort. Based on the maintenance of 14 facilities these will vary in steps of plus or minus 147 peak vehicles and are are related to peak vehicles for individual route-cost allocation.

Administration and Supervision Wages: These are the wages associated with the administration and supervision of the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Training and Fringe Benefits: This is the cost of training and other allocated fringe benefits for the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies used by the maintenance effort of the Facility Maintenance Department. Based on maintenance of 14 facilities these costs will vary in steps of plus or minus 147 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities allocated to the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses related to the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Maintenance General Department

Instruction Wages: These are the wages associated with the 11 instructors in the maintenance department. They will vary in steps of plus or minus 188 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Instruction Fringes: These are the fringe benefits calculated for the 11 instructors associated with the maintenance department. They will vay in steps of plus or minus 188 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Wages: These are the wages associated with the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are costs of training and other fringe benefits utilized by the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies for the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities allocated to the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses for the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Equipment Engineering Department

Wages: These are the wages the employees of the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are training and other fringe benefits allocated to the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies for the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities allocated to the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses for the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Telecommunications Department

Electronic Maintenance Wages: These are the wages for the 37 electronic maintenance employees assigned to the Telecommunications Department. They will vary in steps of plus or minus 56 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Electronic Maintenance Fringes: These are the fringe benefits calculated for the 37 employees involved in this effort. They will vary in steps of plus or minus 56 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Administrative Wages: These are the wages associated with the adminstration of the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are costs of training and other fringe benefits allocated to the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services associated with the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies associated with the maintenance of the radios on the revenue equipment. These costs will vary directly by the number of peak vehicles and are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies associated with the Telecommunications Department efforts. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities allocated to the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses associated with the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Safety Department

Wages: These are the wages for employees of the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are costs of training and other fringe benefits allocated to the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies associated with the Safety Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities allocated to the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses of the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Transit Police Department

Police Wages: These are wages for the 34 uniformed officers assigned to passenger security efforts for SCRTD. These costs will vary in steps of plus or minus 13,688,235 passengers and are related to passengers for individual route-cost allocation.

Police Fringes: These are the fringe benefits calculated for the 34 officers assigned to passenger security efforts for the SCRTD. These costs will vary in steps of plus or minus 13,688,235 passengers.

Police Wages: These are the wages associated with the 17 officers assigned to transportation service inspections. These costs will vary in steps of plus or minus 420,706 hours and are related to hours of service for individual route-cost allocation.

Police Fringes: These are the fringe benefits calculated for the 17 police officers assigned to transportation service inspections for the SCRTD. These costs will vary in steps of plus or minus 420,706 hours and are related to hours of service for individual route-cost allocation.

Administrative Wages: These are the wages associated with the administration and other duties of the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are training and other fringe benefits allocated to the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services provided for the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies for the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities allocated to the Transit Police Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses of the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Scheduling Department

Schedule-maker Wages: These are the wages of those schedule-makers considered variable with large amounts of service hour changes. These costs are variable in steps of plus or minus 596,000 hours and are related to hours of service for individual route-cost allocation.

Schedule-maker Fringes: These are the fringe benefits calculated for the 12 schedule-makers considered variable based on large amounts of service changes. These costs will vary in steps of plus or minus 596,000 hours and are related to hours of service for individual route-cost allocation.

Checker Wages: These are the wages associated with the 51 checkers assigned to the Scheduling Department. These costs will vary in steps of plus or minus 45.5 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Checker Fringes: These are the fringe benefits calculated for the 51 checkers assigned to the Scheduling Department. These costs will vary in steps of plus or minus 40.5 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Wages: These are the wages for the administration and other employees of the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are the costs of training and other fringe benefits allocated to the Scheduling Department. These costs are considered fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services provided for the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are the costs of telephone and other utilities expenses allocated to the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are the costs of travel and other miscellaneous expenses of the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Assistant General Manager for Planning and Communications

Wages: These are the wages associated with the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are the costs of training and other fringe benefits allocated to the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services allocated to the Assistant G.M. for Planning and Communications. These costs are assumed fixed by are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: These are the costs of materials and supplies for the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are the costs of telephone and other utility services allocated to the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are the costs of travel and other miscellaneous expenses for the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Planning Department

Wages: These are the costs of wages associated with employees of the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are the costs of training and other fringe benefits allocated to the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services provided for the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are the costs of telephone and other utilities allocated to the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are the costs of travel and other miscellaneous expenses allocated to the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Marketing and Communications Department

Ticket Clerk Wages: These are the wages associated with the 22 ticket clerks involved in sales of materials to SCRTD passengers. These costs will vary in steps of plus or minus 21,154,545 passengers and are related to passengers for individual route-cost allocation.

Ticket Clerk Fringes: These are the fringe benefits calculated for the 22 ticket clerks assigned to sell materials to SCRTD passengers. These costs will vary in steps of plus or minus 21,154,545 passengers and are related to passengers for individual route-cost allocation.

Wages: These are the wages for administrative and other employees assigned to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Fringes: These are the costs of training and other fringe benefits allocated to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Services: This is the cost of services allocated to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities allocated to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Miscellaneous Expenses: These are the costs of travel and other miscellaneous expenses allocated to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Customer Relations Department

Telephone Clerk's Wages: These are the costs of wages for the 94 telephone clerks assigned to the Customer Relations Department. These costs will vary in steps of plus or minus 4,951,064 passengers and are related to passengers for individual route-cost allocation.

Telephone Clerk's Fringes: These are the costs of fringe benefits for the 94 telephone clerks assigned to the Customer Relations Department. These costs will vary in steps of plus or minus 4,951,064 passengers and are related to passengers for individual route-cost allocation.

Wages: This is the cost of wages for administrative and other personnel assigned to the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Fringes: This is the cost of training and other fringe benefits allocated to the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Services: This is the cost of services allocated to the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Materials and Supplies: These are the costs for materials and supplies utilized by the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Utilities: This is the cost of telephone and other utility expenses for the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Miscellaneous Expenses: These are the costs of travel and other miscellaneous expenses allocated to the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

Assistant General Manager for Governmental and Community Affairs

Wages: This is the cost of wages for employees of the Assistant G.M. for Government and Community Affairs. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies for the Assistant G.M. for Government and Community Affairs. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are the costs of telephone and other utilities allocated to the Assistant G.M. for Government and Community Affairs. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are the costs of travel and other miscellaneous expenses for to the Assistant G.M. for Government and Community Affairs. These

costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Government Affairs Unit

Wages: This is the cost of wages for employees of the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: This is the cost of training and other fringe benefit costs allocated to the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies for the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are the costs of telephone and other utilities expenses allocated to the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: These are the costs of travel and other miscellaneous expenses allocated to the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Community Relations Department

Wages: This is the cost of wages for employees of the Community Relations Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are costs of training and other fringe benefits allocated to the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Services: These are the costs of services utilized by the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utility expenses allocated to the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Assistant General Manager for Equal Opportunity

Wages: This is the cost of wages for employees of the Assistant GM for Equal Opportunity. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies used by the Assistant GM for Equal Opportunity. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Assistant GM for Equal Opportunity. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the Assistant GM for Equal Opportunity. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Human Relations Department

Wages: This is the cost of wages for employees of the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Fringes: This is the cost of training and other fringe benefits allocated to the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Services: This is the cost of services utilized by the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Materials and Supplies: This is the cost of materials and supplies utilized by the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Employee Education, Training, and Development Department

Wages: This is the cost of wages for employees of the Employee Educaton, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Fringes: This is the cost of training and other fringe benefits allocated to the Employee Educaton, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Services: This is the cost of services utilized by the Employee Educaton, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Materials and Supplies: This is the cost of materials and supplies utilized by the Employee Education, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Employee Education, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the Employee Education, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Controller-Treasurer-Auditor Department

Wages: This is the cost of wages for employees of the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Fringes: This is the cost of training and other fringe benefits allocated to the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Services: This is the cost of services utilized by the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Materials and Supplies: This is the cost of materials and supplies utilized by the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Accounting and Fiscal Department

Payroll, Clerk, Wages: These are the costs associated with the 16 payroll clerks assigned to the department. These costs will vary in steps of plus or minus 447,000 hours and are related to hours of service for individual route-cost allocation.

Payroll, Clerk, Fringes: These are the fringe benefits calculated for the 16 payroll clerks assigned to the accounting and fiscal Department. These costs will vary in steps of plus or minus 447,000 hours and are related to hours of service for individual route-cost allocation.

Cash Clerk Wages: These are the costs associated with the 28 cash clerk employees of the department. These costs will vary in steps of plus or minus 16,621,429 passengers and are related to passengers for individual route-cost allocation.

Cash Clerk Fringes: These are the fringe benefits calculated for the 28 cash clerks assigned to the department. These costs will vary in steps of plus or minus 16,621,429 passengers and are related to passengers for individual route-cost allocation.

Wages: These are the wages associated with the other employees of the Accounting and Fiscal Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: This is the cost of training and other fringe benefits allocated to the Accounting and Fiscal Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Accounting and Fiscal Department. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Accounting and Fiscal Department. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utility expenses allocated to the Accounting and Fiscal Department. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses for the department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Data Processing Department

Wages: This is the cost of wages for employees of the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Fringes: This is the cost of training and other fringe benefits allocated to the Data Processing Department. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocations.

Services: This is the cost of services utilized by the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Materials and Supplies: This is the cost of materials and supplies utilized by the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses for the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Office of Insurance

Wages: These are wages for the Office of Insurance employees. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Fringes: This is the cost of training and other fringe benefits for the department employees. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocations.

Services: This is the cost of services utilized by the Office of Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Materials and Supplies: This is the cost of materials and supplies utilized by the Office of Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses associated with the Office of Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses for the Office of Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Assistant General Manager for Transit System Development

Wages: These are wages for the employees of the Assitant G.M. for Transit System Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Materials and Supplies: This is the cost of materials and supplies for the Assistant G.M. for Transit System Development. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Assistant G.M. for Transit System Development. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses for the Assitant G.M. for Transit System Development. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Bus Facilities Engineering

Wages: These are wages for the employees of the Bus Facilities Engineering Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Fringes: This is the cost of training and other fringe benefits allocated to Bus Facilities Engineering. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocations.

Services: This is the cost of services utilized by the Bus Facilities Engineering. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Materials and Supplies: This is the cost of materials and supplies utilized by Bus Facilities Engineering. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenditures allocated to the Bus Facility Engineering. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses utilized by Bus Facility Engineering. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Assistant General Manager for Management

Wages: This is the cost of wages for the employees of the Assitant G.M. for Management. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Materials and Supplies: This is the cost of materials and supplies for the Assistnat G.M. for Management. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Assistant G.M. for Management. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses for the Assitant G.M. for Management. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Contracts and Purchasing Department

Stores Wages: These are the wages associated with 13 storekeepers and 26 stockclerks assigned to 13 different operating facilities and considered variable.

These costs will vary in steps of plus or minus 159 peak vehicles and are related to peak vehicles for indiviudal route-cost allocation.

Stores Fringes: These are the fringe benefits calculated for the 13 storekeepers and 26 stockclerks assigned to the various operating facilities. These steps will vary in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Wages: These are the wages of administrative and other employees assigned to the Contracts and Purchasing Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: This is the cost of training and other fringe benefits allocated to the Contracts and Purchasing Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Contracts and Purchasing Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Contract and Purchasing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Contract and Purchasing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the Contracts and Purchasing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Personnel Department

Wages: This is the cost of wages for those employees assigned to the Personnel Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: This is the cost of training and other fringe benefits allocated to the Personnel Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Personnel Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Personnel Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Personnel Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses for the Personnel Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

General Services Department

Wages: These are the wages associated with employees of the General Services Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are costs of training and other fringe benefits allocated to the General Services Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services provided for the General Services Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the General Services Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utilities allocated to the General Services Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the General Services Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Print Shop

Wages: This is the cost of wages for those employees assigned to the Print Shop. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: This is the cost of training and other fringe benefits allocated to the Print Shop. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Print Shop. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Timetables: This is the cost of timetables printed by the Print Shop. These costs will vary directly by the number of passengers served and are related to passengers for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Print Shop. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utilities allocated to the Print Shop. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the Print Shop. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Office of Management and Budget

Wages: This is the cost of wages for those employees of the Office of Management and Budget. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: This is the cost of training and other fringe benefits allocated to the Office of Management and Budget. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Office of Management and Budget. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Office of Management and Budget. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utilities allocated to the Office of Management and Budget. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses utilized by the Office of Management and Budget. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Labor Relations Department

Wages: This is the cost of wages for employees of the Labor Relations Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: This is the cost of training and other fringe benefits allocated to the Labor Relations Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Labor Relations Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Labor Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utilities allocated to the Labor Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the Labor Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Employee Activities Department

Wages: This is the cost of wages for those employees of the Employee Activities Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Employee Activities Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies utilized by the Employee Activities Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utilities allocated to the Employee Activities Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Miscellaneous Expenses: This is the cost of travel and other miscellaneous expenses allocated to the Employee Activities Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Non-Departmental Expenses

Wages: This is the cost of wages not assigned to any other departments within the organization of SCRTD. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: Most fringes within the budget process at SCRTD are assigned to the non-departmental expenses. As this model was developed, fringe benefits for employees that are considered variable were reallocated out of the non-departmental expense category and assigned to departments that were appropriate. These reallocated dollars were removed from the non-departmental expense fringe category and the balance are the fringe benefits associated with all non-variable SCRTD employees. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Workman's Compensation: These are workman's compensation claims estimated to relate to the bus operators. These costs will vary in steps of plus or minus 777 hours based on an approximate 4,600 bus operators and are related to hours of service for individual route-cost allocation.

Workman's Compensation: These are workmen's compensation claims associated with the maintenance department at the SCTRD. Based on approximately 1,600

maintenance employees, these costs will vary in steps of plus or minus 59,451 miles and are related to miles of service for individual route-cost allocation.

Workman's Compensation: These are workmen's compensation claims not associated with bus operators or the maintenance department operations. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services assigned to the Non-departmental Expenses. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fuel: This is the cost of fuel for revenue vehicles operated at SCRTD. These costs will vary directly by the miles of service provided and are related to miles of service for individual route-cost allocation.

Materials and Supplies: This is the cost of materials and supplies assigned to the Non-departmental Expenses category. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities assinged to the Non-departmental Expense category. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Premiums for Physical Damage: This is the cost for premiums for physical damage insurance for SCRTD property. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Premiums for PL and PD Insurance: This is the cost of premiums for PL and PD Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Premiums for Corporate Insurance: These are premiums for the Corporate Insurance for SCRTD. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Provisions for Uninsured PL: This is the provision for the Uninsured portion of the liability insurance for the SCRTD. Based on approximately 4,600 claims annually, these costs will vary in steps of plus or minus 101,174 passengers and are related to passengers for individual route-cost allocation.

Provisions for Uninsured PD: These are costs associated with the uninsured portion of the property damage insurance for SCRTD. Based of approximately 2,400 claims these costs will vary in steps of plus or minus 39,634 miles and are related to miles of service for individual route-cost allocation.

Expenses for PL: These are the expenses for processing the liability claims for the SCRTD. Based on approximately 4,600 claims in this category per year these will vary in steps of plus or minus 101,174 passengers and are related to passengers for individual route-cost allocation.

Expenses for PD: These are the expenses for processing the property damages claims for the SCRTD. These costs, based on approximately 2,400 claims in this category for a year, will vary in steps of plus or minus 39,634 miles and are related to miles for individual route-cost allocation.

Fuel and Lube Taxes, Non-Revenue Equipment: This is the Fuel and Lube Taxes for the fuel purchases for non-revenue equipment for the SCRTD. These costs are assumed fixed and are related to hours of service for individual route-cost allocation.

Fuel and Lube Taxes, Revenue Equipment: These are the Fuel and Lube Taxes from the purchase of fuel for the revenue equipment operations for the SCRTD. These costs will vary directly by the miles of service and are related to the miles of service for individual route-cost allocation.

Leases and Rentals: This is the cost of Leases and Rentals for SCRTD equipment and facilities. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

Operating Statistics

The following projected operating statistics were supplied by SCRTD for the FY 84 operations. These statistics will be used to calibrate the model in the FY 84 base year.

Annual Revenue Vehicle Miles:	95,122,000
Annual Revenue Hours of Service:	7,152,000
Unlinked Passenger Trips:	465,400,000
Peak Vehicles:	2,063

Inflation

All the costs identified in the operations cost model are projected FY 84 expenditures. These costs will be used to project future costs. Operating costs will be presented in both future-year dollars and in 1984 dollars.

Table 2 prsents the projected baseline inflation rates applied in calibrators to the bus operating cost model developed in Minneapolis, Minnesota and Table 3 presents the projected baseline inflation rates applied in calibrators to the bus operating cost model developed in St. Louis, Missouri. These rates are the United States Cities Average All-Item value for the Consumer Price Index (CPI-U). Tables 2 and 3 also present incremental inflation rates that were developed for components of operating cost which it is believed will differ from the CPI. As can be seen, incremental rates can be assumed for wages, fringes, bus parts, diesel fuel, and utility costs. It is recommended that a baseline rate be established for SCRTD projections and incremental rates, if appropriate, be established for wages, fringes, bus parts, and diesel fuel.

The baseline CPI and incremental inflation rates were applied to compute compounded inflation factors for specific cost components. The general form of the equation for computing the factors was:

Table 2
INFLATION RATES AND FACTORS (FY 83 IS BASE YEAR)

Inflation Category	Inflation Rate or Factor	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Baseline[1] (CPI-U)	Rate	0.00%	4.90%	4.80%	5.10%	5.40%	6.00%	6.00%	6.20%	6.40%	6.40%	6.50%	6.40%	6.40%	6.40%	6.40%	6.40%	6.40%	6.40%
	Factor (Infl.$)	1.0000	1.0490	1.0994	1.1554	1.2178	1.2909	1.3683	1.4532	1.5462	1.6451	1.7521	1.8642	1.9835	2.1004	2.2455	2.3892	2.5421	2.7048
	Factor (Cons.$)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Diesel Fuel[2]	Incremental Rate	0.00%	3.63%	3.51%	4.03%	3.88%	3.73%	3.60%	3.47%	4.03%	3.87%	3.73%	3.59%	3.47%	1.79%	1.76%	1.73%	1.70%	1.67%
	Factor (Infl.$)	1.000	1.0853	1.1755	1.2828	1.4019	1.5383	1.6859	1.8490	2.0418	2.2515	2.4818	2.7298	2.9992	3.2448	3.5096	3.7949	4.1023	4.4333
	Factor (Cons.$)	1.000	1.0346	1.0693	1.1103	1.1511	1.1916	1.2321	1.2724	1.3206	1.3686	1.4165	1.4643	1.5121	1.5375	1.5629	1.5884	1.6137	1.6391
Bus Parts[3]	Incremental Rate	0.00%	1.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Factor (Infl.$)	1.0000	1.0600	1.1109	1.1675	1.2306	1.3044	1.3827	1.4684	1.5624	1.6624	1.7704	1.8837	2.0043	2.1326	2.2691	2.4143	2.5688	2.7332
	Factor (Cons.$)	1.0000	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105	1.0105
Other Direct Costs	Incremental Rate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Factor (Infl.$)	1.0000	1.0490	1.0994	1.1554	1.2178	1.2909	1.3683	1.4532	1.5462	1.6451	1.7521	1.8642	1.9835	2.1004	2.2455	2.3892	2.5421	2.7048
	Factor (Cons.$)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

(1) Source: Minnesota State Department of Finance, January, 1984.

(2) Source: Argonne National Laboratory, Center for Transportation Research, Energy and Environmental Systems Division, April, 1982.

(3) MTC Estimte

Table 3
INFLATION RATES AND FACTORS (FY 83 IS BASE YEAR)

Inflation Category	Inflation Rate or Factor	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Baseline[1] (CPI-U)	Rate	0.00%	4.30%	5.10%	5.60%	6.10%	6.20%	6.50%	6.70%	6.80%	6.60%	6.50%	6.50%	6.40%
	Factor (Inflated $)	1.0000	1.0430	1.0962	1.1576	1.2283	1.3043	1.3891	1.4822	1.5830	1.6875	1.7971	1.9140	2.0365
	Factor (Constant $)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Wages[2]	Incremental Rate	0.00%	-4.20%	-3.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Factor (Inflated $)	1.0000	1.001	1.0210	1.0782	1.1440	1.2149	1.2939	1.3805	1.4744	1.5717	1.6739	1.7827	1.8968
	Factor (Constant $)	1.0000	.9597	.9314	.9314	.9314	.9314	.9314	.9314	.9314	.9314	.9314	.9314	.9314
Fringes[2]	Incremental Rate	0.00%	5.70%	4.90%	4.40%	3.90%	3.80%	3.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Factor (Inflated $)	1.0000	1.1000	1.2100	1.3310	1.4641	1.6105	1.7716	1.8903	2.0188	2.1520	2.2919	2.4409	2.5971
	Factor (Constant $)	1.0000	1.0546	1.1038	1.1498	1.1921	1.2347	1.2753	1.2753	1.2753	1.2753	1.2753	1.2753	1.2753
Diesel Fuel[3]	Incremental Rate	0.00%	3.63%	3.51%	4.03%	3.88%	3.73%	3.60%	3.47%	4.03%	3.87%	3.73%	3.59%	3.47%
	Factor (Inflated $)	1.0000	1.0793	1.1722	1.2851	1.4134	1.5537	1.7106	1.8846	2.0887	2.3074	2.5435	2.8001	3.0765
	Factor (Constant $)	1.0000	1.0348	1.0694	1.1102	1.1508	1.1912	1.2315	1.2715	1.3195	1.3674	1.4153	1.4630	1.5107
St. Louis Electricity[4]	Incremental Rate	0.00%	3.70%	19.9%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Factor (Inflated $)	1.0000	1.0800	1.3500	1.4256	1.5126	1.6063	1.7108	1.8254	1.9495	2.0782	2.2132	2.3571	2.5080
	Factor (Constant $)	1.0000	1.0355	1.2315	1.2315	1.2315	1.2315	1.2315	1.2315	1.2315	1.2315	1.2315	1.2315	1.2315
Other Direct Costs	Incremental Rate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.005
	Factor (Inflated $)	1.0000	1.0430	1.0962	1.1576	1.2283	1.3043	1.3891	1.4822	1.5830	1.6875	1.7971	1.9140	2.0365
	Factor (Constant $)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

[1] Source: Data Resources, Inc., March, 1983.

[2] Bi-State Estimate.

[3] Source: Argonne National Laboratory, Center for Transportation Research, Energy and Environmental Systems Division, April, 1982.

[4] Source: Union Electric Co., St. Louis, one-half their current and potential rate requests.

$$CTIF_{in} = (1.0 + CPI_1 + INCR_{1n}) \times (1.0 + CPI_2 + INCR_{2n}) \times \ldots \times (1.0 + CPI_n + INCR_{in})$$

Where:

$CTIF_{in}$ = compounded total inflation factor for cost component n, in year i

CPI_i = inflation rate of consumer price index expressed as a fraction (e.g., 3% = 0.03), in year i

$INCR_{in}$ = incremental ("real") inflation rate for cost component n, expressed as a fraction, in year i

The inflation factors computed in this manner were used to estimate costs in inflated dollars. The so-called "uninflated" costs reflected the incremental inflation only, but did not directly include the baseline CPI values. The inflation factors were computed as follows:

$$CIIF_{in} = \frac{1.0 + CPI_1 + INCR_{1n}}{1.0 + CPI_1} \times \frac{1.0 + CPI_2 + INCR_{2n}}{1.0 + CPI_2} \times \ldots \times \frac{1.0 + CPI_i + INCR_{in}}{1.0 + CPI_i}$$

where:

$CIIF_{in}$ = compounded incremental inflation factor for cost component n, in year i

Thus:

$$CTIF_{in} = (CIIF_{in}) \pi_i \ (1.0 + CPI_i)$$

Note that $CIFF_{in}$ <u>cannot</u> be computed simply as:

$$CIIF_{in} \neq (1.0 + INCR_{in}) \times (1.0 + INCR_{2n}) \times \ldots \times (1.0 + INCR_{in})$$

Articulated Bus Unit Costs

Current cost experience for SCRTD, as reflected in the cost allocation model, is for buses already in the SCRTD fleet. This fleet includes standard 35-foot and 40-foot urban coaches but also includes a small percentage of double-decked buses and articulated buses.

If plans exist to change the current ratio of standard buses to articulated buses, the model should be sensitive to these changes and the cost differentials that may exist between standard urban coaches and articulated buses.

No data was readily available on articulated bus costs of SCRTD at the time of the visits to gather materials for development of this bus cost model. If data now exists to differentiate between standard buses and articulated SCRTD buses, this should be utilized. If not, Table 4 presents a comparison between Bi-State factors and articulated bus cost data. These ratios could serve to differentiate between SCRTD standard buses and articulated buses until SCRTD data is collected and analyzed.

Table 4
COMPARISON OF VEHICLE MAINTENANCE UNIT COST FACTORS FOR BI-STATE CURRENT FLEET AND ARTICULATED BUSES

Cost Area	Bi-State Current Factor	Articulated Bus Factor
Station Service Personnel	1 Worker per 7.36 buses	1 Worker per 5 articulated buses.
Station Repairmen	1 Worker per 202,338 miles	1 Worker per 152,076 Articulated Miles.
Main Shop Repairmen	1 Worker per 4.41 buses	1 Worker per 3.15 Articulated Buses/
Tires and Tubes	2.16 ¢ per Mile	4.32 ¢ per Mile
Diesel Fuel	23.71 ¢ per Mile	27.50 ¢ per Mile
Maintenance Parts and Supplies	11.50 ¢ per Mile	17.30 ¢ per Mile

GENERAL PLANNING CONSULTANT:

TECHNICAL MEMORANDUM 5.5.1

OPERATING AND CAPITAL FUNDING PROGRAM

(PRELIMINARY)

Prepared for:

Southern California Rapid Transit District

Prepared by:

Schimpeler.Corradino Associates

in association with

Barton-Aschman Associates
Cordoba Corporation
Deloitte Haskins & Sells
Myra L. Frank & Associates
Robert J. Harmon & Associates
Manuel Padron
The Planning Group, Inc.

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FINANCIAL OPERATING PLAN

I. INTRODUCTION

This document describes the Financial Operating Plan (F.O.P.) of the SCRTD for the years 1985 through 2000. This F.O.P. covers operating and capital costs and revenues of RTD's bus system, as well as Metro Rail MOS-1 segment and the light rail line from L.B. to L.A. The F.O.P. model was developed using a computerized spread sheet program - Lotus 1-2-3. This program is capable of evaluating different operating and funding scenarios, as well as various assumptions about general background economics conditions. The purpose of the model is to provide the decision makers in SCRTD with a tool capable of estimating future operating and capital deficits or surpluses resulting from various operating and capital investment assumptions and policies. A brief description of all the items included in the model will be discussed in the next chapter; here we first describe the general framework of the F.O.P. model and its basic structure.

The F.O.P. model covers all the operations and capital investments of SCRTD from FY 1985 through FY 2000. The model is completely general and allows the inclusion of any transit projects scheduled for construction in L.A. County and/or operation by SCRTD. However, in its present version only the following three transit subsystems were included:

1. Metro Rail MOS-1 line from union station to Wilshire/Alvarado as defined in the Environmental Assessment Report and scheduled to start operations in the year 1990.

2. The light rail line from L.B. to downtown L.A. as described in the L.B.-L.A. Environmental Impact Report as LA-1/MC-1/LB-2 baseline alternative, scheduled to start operations in the year 1990.

3. The entire SCRTD bus system adjusted in the year 1990 to operate in coordination with the mentioned above rail lines; that is, adjusted to provide desired feeder and background support for the two (2) rail services.

All money amounts in the F.O.P model are presented in their current (inflated) dollars, unless otherwise noted; all calculations are in inflated dollars. The basic structure of the model consists of the following steps:

A. Operating costs and revenues

1. All operating costs are stated in current (inflated) dollars, and are the results of the appropriate UTPS runs.

2. Passenger revenues for all elements of the transit system are added to other revenue sources to produce the total revenues of the system.,

3. The operating deficit is estimated by subtracting the operating revenues from operating costs.

4. All local, state and federal grants uniquely dedicated for operating subsidies are calculated and summed.

5. The unique operating grants are compared with the operating deficit; if grants are sufficient to cover deficit, no further action is taken. If grants do not suffice, the left over deficit is covered by the 40% pool within Prop A which can be used for operating or capital funds at the discretion of LACTC.

6. A test is made to check whether the 40% pool within Prop. A is enough to cover the operating deficit. If the funds suffice the balance remaining in the 40% Prop. A pool after covering the operating deficit is transferred for capital investment. If those monies are not sufficient an error message is printed.

B. Capital costs and funding

1. All capital costs (on a commitment basis) are calculated and summed up.

2. All local, state and federal fundings (grants), including the balance (after operating requirements) left in the 40% pool within Proposition A are evaluated and summed.

3. The capital grants are subtracted from capital costs to indicate surplus or deficits of capital funds. The deficit is assumed to be covered by UMTA sec 3 grant; any surplus is the amount of funds available for other transit capital projects.

II. DEFINITION OF LINE ITEMS IN F.O.P. MODEL

A major part of the effort of developing the F.O.P. model was devoted to identifying the dollar amounts available to SCRTD from various local, state and federal grants and funding sources. Those funds, as well as other basic necessary information for the model are presented in Table I. The information in the table pertains to FY 1983 through FY 2000. Each row in the table is identified by its left most column. A brief description of revenue sources and those factors which define revenue levels is given below:

A. Basic background information

Background information includes two main groups of the items: (a) arrival C.P.I. changes; and, (b) annual population and income in L.A. County. The C.P.I. values are based on LACTC predictions of C.P.I. to be used for long term forecasts. The basic population and income figures were produced by SCAG for long range transportation planning. The per capita income and population predictions are used to evaluate sales tax revenues which are the basis for Proposition A and TDA monies. Based on past experience the taxable sales in L.A. County are in the range of about 50% to 53% of total income of residents in L.A. County. Two scenarios were developed to reflect sales tax trend: high level of funds driven by sales tax receipts which assume 0.53 of total income, and low level of sales tax receipts which assumes spending of 0.50 of total income.

Additional assumptions relate to SCRTD's share of most federal, state and local taxes dedicated for transit in L.A. County. Based on a formula established by the California Legislature which account for population and transit service (measured by transit revenues) SCRTD's share is 86% of each grant.

B. Operating Costs and revenues

Operating costs and revenues are the results of specific UTPS computer runs calibrated to reflect SCRTD cost and fare structures. The UTPS simulations were performed for the years in which significant changes in the transit system occur. The revenues reflect SCRTD's policy which assumes that the base transit fares return to pre-Proposition A level (in nominal $) in FY 1986 and will rise to double the pre-Proposition A level (in terms of constant dollars) in FY 1989. From FY 1990 on, the fare will stay the same in constant dollars through FY 2000. Both fares and costs are adjusted for inflation according to the projected C.P.I. values. Rail operating costs for Metro Rail MOS-1 and Long Beach-Los Angeles were taken from their respective Environmental Impact reports. Revenues of both rail system are included in total revenues produced by the UTPS simulations.

C. Construction and Capital Costs

Construction costs of the Metro Rail and Long Beach-Los Angeles light rail lines are stated in terms of committed funds for construction. The funds for Metro Rail are based on the proposed construction schedule as stated in Metro Rail EIR. The funds for L.B.-L.A. are based on preliminary construction estimates of the LACTC. Other capital expenditures include the following items:

1. Bus acquisitions and replacements which are based on detailed schedules through FY 1997 and estimates of needs for the rest of the period.

2. Capital costs for buildings and structures, land acquisition and office equipment and furnishings are based on detailed schedules developed by SCRTD through FY 1989, and predictions of needs FY 1990 through FY 2000.

D. Non- operating revenues consist of two items:

1. Auxiliary Transportation revenues which are mainly income streams anticipated by the SCRTD from advertising.

2. Non Transportation revenues which are income streams gained by the SCRTD as interest on various accounts.

E. Local Grants and Funds

1. Proposition A is collected as 0.5% of taxable sales in Los Angeles County. This fund can be used for both capital and operating assistance according to the following formula which provides that in FY 1983, FY 1984 and FY 1985, 25% of the money is given to cities in L.A. County; 86% of the remaining 75% of the fund is dedicated to SCRTD to cover the operating deficit resulting from fare reductions. The amount left in SCRTD's share after covering the operating deficit can be used for capital investment. From FY 1986 on, Proposition A money is divided by another formula as follows: 25% is dedicated to cities in L.A. County, and 35% is assigned to capital investment in rail projects in L.A. County. The remaining 40% can be used for both capital and operating expenses at the discretion of LACTC. The assumptions made in the F.O.P. model is that 86% of the discretionary 40% Proposition A money will be used by SCRTD first to cover the leftover operating

deficit after accounting for all available operating grants. The money remaining after accounting for the operating deficit will be used capital investment.

2. TDA is a state fund distributed to counties based on the local share of sales tax collected at each county. The TDA for Los Angeles County is by definition 0.25% of taxable sales. Out of the total amount returned to L.A. County, 6% is assigned to various non R.T.D. non transit projects. 86% of the remaining 94% of these funds are committed by formula to SCRTD. Out of this, 15% is assigned to capital investments and 85% for operating subsidy. TDA, being based on taxable sales, is also influenced by the model's assumptions on taxable sales in Los Angeles County.

3. Local operating contractual payments are funds transmitted to SCRTD by Riverside, Orange and San Bernardino Counties for transit services provided by SCRTD. Those payments are expected to continue on the same level (adjusted for C.P.I) through the year 2000.

4. Benefit Assessment funds are the amount of monies to be received from bonds issued against income anticipated from Benefit Assessment District revenues associated with the five (5) Metro Rail MOS-1 stations.

5. City of Los Angeles funds are the present commitments of the city to the construction of Metro Rail MOS-1 and are derived by the city from 25% local return pool within Proposition A.

F. State Funds and Grants

1. STA-State Transit Assistance funds are allocated to counties by formula based on their population and transit revenues. STA monies are 60% of the TP&D (Transportation planning and development account) which are generated by a formula which is dependent on state gasoline tax revenues and money generated by state sales tax revenues. SCRTD receives 86% of STA money allocated to Los Angeles County and uses it at its discretion to cover operating deficits or for capital investment. The STA figures used are the predictions of SCAG.

2. Article XIX funds are general funds allocated by the state for highways and fixed guideways construction. The funds stated in the F.O.P. model are the stated commitments of the state for the construction of Metro Rail MOS-1.

G. Federal funds and Grants

1. Section 9 Federal funds are formula dollars assigned for both operating subsidy and capital investment. This fund is defined through FY 1986. At present there is no clear definition of what amount of section 9federal support will be available starting FY 1987 and continuing through FY 2000. To account for this uncertainty, two scenarios were developed with respect to funds available from FY 1987 through FY 2000. Both scenarios are identical for FY 1985 and 1986. For the first two years the stated amount available in section 9 monies are SCAG estimates. By law $47.5M in inflated dollars can be used for operating subsidy and the rest of the money has to be used for capital investment. Scenario 1 which represents the pessimistic assumption

from SCRTD's point of view assumes that the future section 9 fund will stay the same as in FY 1986 in terms of inflated dollar, i.e. will decline in terms of constant dollars. The operating subsidy is also kept fixed at a level of $47.5M inflated dollars. Scenario 2 is the more optimistic; it assumes that from FY 1987 through FY 2000 the total section 9 monies will stay fixed as in FY 1986 in terms of constant dollars thus increasing in inflated dollars from year to year. The operating subsidy will also stay fixed in terms of constant 1986 dollars, while the amount available for capital investment will be the difference between the total amount available in section 9 fund and the assigned operating subsidy.

2. UMTA section 3 funds are discretionary funds available for capital investment in transit projects. In the F.O.P. model it is assumed that the deficit in capital investment for the two rail projects (after accounting for all dedicated local, state, and federal grants) will be covered by UMTA section 3 grants.

3. Other federal assistance consists mainly of federal funds committed for technical studies and is assumed to stay at it's present level in constant dollars, thus increasing only due to inflation.

III. MODEL STRUCTURE AND OUTPUT

The output of the F.O.P. model is presented in table II and is self explanatory. As stated above it was programmed using LOTUS 1-2-3 and thus is very flexible when it is necessary to evaluate different financial assumptions and various scenarios regarding future development. It is rather easy to evaluate the

financial operating plan assuming different C.P.I. values, population growth etc., and thus produce an almost infinite number of reports. The figures included in the model represent SCRTD's best estimates of the relevant information. Eight (8) possible alternatives were programmed into the F.O.P. Model; they represent two scenarios for each of the following variables.

A. Available UMTA section 9 fund - Two scenarios were assumed regarding the size and distribution of this fund in the future the details of these assumptions were stated above.

B. Available Proposition A and TDA funds due to two alternative assumptions on percentage of spent income, are presented.

C. Size of SCRTD transit service - The following two possible policies are assumed:

1. The level of service of SCRTD will stay systemwide at its current level.

2. The level of service will be adjusted so that the total operating costs of the system including rail service will not exceed $500M in 1983 dollars.

Operating costs and revenues for both SCRTD bus and rail systems are the result of the appropriate UTPS simulations.

TABLE I

GENERAL BACKGROUND INFORMATION AND FUNDING SOURCES

CPI	0.20	4.30	5.30	5.90	7.20	6.50	6.10	5.40	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
ACUM. CPI(83=100)	100.00	104.30	109.83	116.31	124.68	132.79	140.89	148.49	156.66	165.28	174.37	183.96	194.08	204.75	216.01	227.89	240.43	253.65
L.A. COUNTY POP.	7,580	7,637	7,692	7,745	7,798	7,850	7,899	7,948	7,995	8,040	8,085	8,128	8,170	8,213	8,251	8,289	8,326	8,362
PERSONAL INCOME(87$)	4,645	4,689	4,755	4,807	4,874	4,946	5,017	5,085	5,153	5,222	5,281	5,362	5,434	5,507	5,582	5,657	5,734	5,812
PERSONAL INCOME(83$)	13,605	13,734	13,927	14,088	14,276	14,487	14,695	14,894	15,093	15,295	15,468	15,775	15,916	16,138	16,350	16,569	16,795	17,023
TAXABLE SALES(83$,M)	54,658	55,590	56,779	57,795	59,282	60,272	61,519	62,740	63,955	65,176	66,281	67,656	68,919	70,212	71,498	72,732	74,112	75,445
TAXABLE SALES(1$,M)	54,658	57,981	62,359	67,220	73,564	80,034	86,672	93,165	100,193	107,721	115,573	124,459	133,754	143,753	154,443	165,887	178,185	191,366
RTD-A REVEN. (1$,M)	273	290	312	336	368	400	433	466	501	539	578	622	669	719	772	829	891	957
RTD-A 35%(1$,M)	95.7	101.5	109.1	117.6	128.7	140.1	151.7	163.0	175.3	188.5	202.3	217.8	234.1	251.6	270.3	290.3	311.8	334.9
RTD RTD-A.40%(1$,M)	94.0	99.7	107.3	115.6	126.5	137.7	149.1	160.2	172.3	185.3	198.8	214.1	230.1	247.3	265.6	285.3	306.5	329.1
L.A.COUNTY TDA(1$,M)	136.6	145.0	155.9	168.1	183.9	200.1	216.7	232.9	250.5	269.3	288.9	311.1	334.4	359.4	386.1	414.7	445.5	476.4
TDA FOR RTD(1$,M)	110.5	117.2	126.0	135.9	148.7	161.7	175.2	188.3	202.5	217.7	233.6	251.5	270.3	290.5	312.1	335.3	360.1	386.8
TDA 85%(1$,M)	93.9	99.6	107.1	115.5	126.4	137.5	148.9	160.0	172.1	185.0	198.5	213.8	229.8	247.0	265.3	285.0	306.1	328.7
TDA 15%(1$,M)	16.6	17.6	18.9	20.4	22.3	24.3	26.3	28.2	30.4	32.7	35.0	37.7	40.5	43.6	46.8	50.3	54.0	58.0
STA (82$,M)	26.6	27.1	27.7	27.5	26.3	28.3	30.3	27.7	28.1	26.4	26.1	24.3	22.7	21.2	19.4	17.2	15.2	13.6
STA FOR RTD(1$,M)	23.7	25.2	27.1	28.5	29.2	33.5	38.1	36.6	39.2	38.8	40.5	39.8	39.3	38.7	37.4	34.9	32.6	30.6
UMTA SEC 9 S1(1$,M)	104.1	122.1	130.8	135.3	135.3	135.3	135.3	135.3	135.3	135.3	135.3	135.3	135.3	135.3	135.3	135.3	135.3	135.3
UMTA SEC 9 S1(82$,M)	100.4	113.8	115.0	112.3	104.7	98.3	92.7	87.9	83.4	79.8	74.9	71.0	67.3	63.8	60.4	57.3	54.3	51.5
SEC 9 CP S1(1$,M)	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
SEC 9 CP S1(1$,M)	56.6	74.6	83.3	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8
UMTA SEC 9 S2(82$,M)	100.4	113.8	115.0	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3
UMTA SEC 9 S2(1$,M)	104.0	122.1	130.8	135.3	145.1	154.5	163.9	172.8	182.3	192.3	202.9	214.0	225.8	238.2	251.3	265.1	279.7	295.1
SEC 9 CP S2(1$,M)	47.5	47.5	47.5	47.5	50.9	54.2	57.5	60.6	64.0	67.5	71.2	75.1	79.3	83.6	88.2	93.1	98.2	103.6
SEC 9 CP S2(1$,M)	56.5	74.6	83.3	87.8	94.1	100.3	106.4	112.1	118.3	124.8	131.7	138.9	146.5	154.6	163.1	172.1	181.5	191.5
UMTA SEC. 8 PCH. AS.			0.50	0.53	0.56	0.60	0.60	0.63	0.67	0.70	0.74	0.78	0.83	0.87	0.92	0.97	1.02	1.08
OTHER FED. CP FUNDS.			0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30
LOCAL CP CONT.(1$,M)			5.5	5.7	6.1	6.4	6.8	7.2	7.6	8.0	8.4	8.9	9.4	9.9	10.4	11.0	11.6	12.2

A. OPERATING COSTS AND REVENUES

	FY-85	FY-86	FY-87	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-96	FY-97	FY-98	FY-99	FY-00
I. OPERATING COSTS																
METRO OP COST(83$,M)	0.0	0.0	0.0	0.0	0.0	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4
LB-LA OP COST(83$,M)	0.0	0.0	0.0	0.0	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
BUS OP-COSTS(83$,M)	410.3	406.5	426.6	446.6	466.7	401.0	409.7	418.5	427.3	436.1	444.9	453.7	462.4	471.2	472.0	472.0
TOTAL OP COST(83$,M)	410.3	406.5	426.6	446.6	479.4	429.0	437.8	446.6	455.3	464.1	472.9	481.7	490.5	499.3	500.0	500.0
TOTAL OP COST(1$,M)	*450.7*	*472.8*	*531.8*	*593.1*	*675.3*	*637.6*	*685.8*	*738.1*	*794.0*	*853.6*	*917.6*	*986.3*	*1,059.5*	*1,137.8*	*1,202.1*	*1,268.2*
II. OPERATING REVENUES																
PASS. REVEN.(83$,M)	111.4	161.4	192.9	224.5	256.1	248.3	253.2	258.2	263.2	268.2	273.2	278.1	283.1	288.1	293.1	298.1
PASS REVEN.(1$,M)	122.3	187.7	240.6	298.2	360.9	368.7	396.7	426.8	458.9	493.3	530.1	569.5	611.6	656.6	704.7	756.1
AUX. REVENEUES(1$,M)	2.6	2.8	2.9	3.1	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2
NON-TRANS REV.(1$,M)	16.0	16.0	17.0	17.0	18.0	18.0	18.0	19.0	19.0	19.0	20.0	20.0	20.0	21.0	21.0	21.0
TOTAL REVENUES(1$,M)	140.9	206.5	260.5	318.3	382.9	390.9	419.1	450.4	482.7	517.3	555.3	594.9	637.2	683.4	731.7	783.3
OP BALANCE(1$,M)	(309.8)	(266.3)	(271.4)	(274.8)	(292.5)	(246.2)	(266.7)	(287.7)	(311.2)	(336.4)	(362.4)	(391.4)	(422.3)	(454.4)	(470.5)	(485.0)
FAREBOX RATIO	0.27	0.40	0.45	0.50	0.53	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.59	0.60
III. OPERATING GRANTS																
LOCAL OP CONT.(1$,M)	5.5	5.7	6.1	6.4	6.8	7.2	7.6	8.0	8.4	8.9	9.4	9.9	10.4	11.0	11.6	12.2
STA 50% OP(1$,M)	13.6	14.2	14.6	16.7	19.0	18.3	19.6	19.4	20.2	19.9	19.6	19.4	18.7	17.5	16.3	15.3
TDA 85%(1$,M)	107.1	115.5	126.4	137.5	148.9	160.0	172.1	185.0	198.5	213.8	229.8	247.0	265.3	285.0	306.1	328.7
SEC 9 OP(1$,M)	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
OTHER FED. ASS(1$,M)	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.3	1.3	1.4
TOTAL OP GRANTS - WITHOUT PROP.A(1$,M)	174.3	183.6	195.3	208.9	223.0	233.8	247.7	260.9	275.7	291.1	307.3	324.8	343.1	362.2	382.8	405.2
OP GRANT FROM PROP.A	135.4	82.7	76.1	65.9	69.5	12.3	19.0	26.8	35.6	45.4	55.1	66.5	79.2	92.2	87.7	79.8
LEFT FOR OP GRANTS - PROP.A 40% DIS(1$,M)	(28.2)	32.9	50.4	71.8	79.6	147.9	153.3	158.5	163.2	168.7	175.0	180.7	186.5	193.1	218.8	249.3
ENOUGH PROP.A?	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEFT FOR CAPITAL IN PROP.A-40%+PROP.A35%	65.7	150.5	179.2	211.8	231.3	311.0	328.6	347.0	365.5	386.5	409.0	432.3	456.7	483.4	530.6	584.2

B. CAPITAL COSTS AND FUNDING

	FY-85	FY-86	FY-87	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-96	FY-97	FY-98	FY-99	FY-00
IV. CAPITAL COSTS																
METRO-RAIL CP (1$,M)	389.0	469.0														
LB-LA RAIL CP(1$,M)	25.0	125.0	200.0	125.0	25.0											
BUS AQUS.&REPL.(1$,M)	3.0	32.0	34.3	49.0	0.0	45.8	13.9	50.3	79.2	83.2	96.5	61.2	91.5	85.1	89.3	93.8
BUILDINGS (1$,M)	24.0	10.0	19.0	28.0	10.0	21.3	22.5	23.7	25.0	26.4	27.8	29.4	31.0	32.7	34.5	36.4
OFFICE EQU.(1$,M)	18.3	14.0	13.0	12.5	11.0	11.6	12.2	12.9	13.6	14.4	15.2	16.0	16.9	17.8	18.8	19.8
LAND(1$,M)	17.0	10.0	10.0	5.0	5.0	5.3	5.6	5.9	6.2	6.5	6.9	7.3	7.7	8.1	8.5	9.0
TOTAL CP COSTS(1$,M)	476.3	660.0	276.3	219.5	59.0	84.0	54.2	92.8	124.0	130.5	146.4	113.8	147.0	143.7	151.1	159.0
V. CAPITAL GRANTS																
LEFT IN PROP.A(1$,M)	65.7	150.5	179.2	211.8	231.3	311.0	328.6	347.0	365.5	386.5	409.0	432.3	456.7	483.4	530.6	584.2
TDA CP 15%(1$,M)	18.9	20.4	22.3	24.3	26.3	28.2	30.4	32.7	35.0	37.7	40.5	43.6	46.8	50.3	54.0	58.0
STA CP 50%(1$,M)	13.57	14.23	14.59	16.73	19.04	18.30	19.60	19.42	20.23	19.89	19.63	19.36	18.68	17.47	16.28	15.32
SEC 9 CP(1$,M)	83.3	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8
BENEFIT ASS(1$,M)	60.3	70.0														
CITY OF L.A.	7.0	10.0														
ARTICLE XIX (1$,M)	53.0	72.0														
TOT. CAPITAL FUNDING W/O UMTA SEC.3(1$,M)	301.8	424.9	303.9	340.6	364.4	445.3	466.4	486.0	508.5	531.8	557.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE II

PRELIMINARY CASH FLOW MO

Keith

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GENERAL PLANNING CONSULTANT:

LODESTAR USER'S MANUAL

IBM-PC VERSION

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Prepared for:

Southern California Rapid Transit District

Prepared by:

Schimpeler Corradino Associates

in association with

Barton-Aschman Associates, Inc.
Cordoba Corporation
Myra L. Frank & Associates
Manuel Padron
The Planning Group, Inc.

August, 1985

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LODESTAR USER'S MANUAL

1. INTRODUCTION

LODESTAR (the LOs Angeles Development and Evaluation System for Transit Alternatives and Resources) has been developed by the General Planning Consultant for the Southern California Rapid Transit District as a planning and management tool. The program utilizes a series of spreadsheets developed using Microsoft MULTIPLAN and can be run on the Apple II or the IBM PC. Instructions in this manual are written for the IBM PC.

LODESTAR currently contains the most recent information on projected SCRTD costs and revenues. Capital and operating costs are included for all heavy rail, light rail, and busway systems under consideration for construction or operation by the SCRTD. Eight heavy rail sections, seven light rail lines, and one busway are currently in the program, representing a possible construction scenario through the year 2010. The program incorporates all the revenue sources available to the District from federal, state, and local sources. The program produces a cash flow analysis on a year-by-year basis by comparing projected annual costs and revenues. This analysis highlights annual deficits and surpluses and year-to-date (cumulative) deficits and surpluses.

The program allows the user to modify basic assumptions such as project definition, project implementation schedule, economic variables (consumer price index, etc.) and various revenue projections

and assess the impacts of these modifications on cash flow. Numerous possible scenarios can be run in a short period, providing the user with the necessary information to make informed decisions regarding the District's complex, multi-year transit development and operations program.

This manual provides an overview of the components of LODESTAR. Each of the operating modules are briefly explained in terms of key functions and interrelationships. Supporting models outside of LODESTAR which produce inputs to the system are identified. The mechanics of running LODESTAR on the IBM PC are explained. The instructions assume a reasonable familiarity with MULTIPLAN and the IBM PC. A MULTIPLAN manual should be consulted if problems arise. Finally, a number of potential management uses of LODESTAR are explained. This information includes some key variables, where they are found in the program and examples of scenarios that might be investigated using this program.

This manual is not meant to be the full technical backup for LODESTAR. Rather, it is a complementary document to the detailed Technical Memorandum that will be a product of the General Planning Consultant's Fiscal Year 1986 work program.

2. LODESTAR: OVERVIEW OF COMPONENTS

2.1 STRUCTURE

LODESTAR is a cash-flow model. It consists of a set of ten integrated spreadsheets or modules. Each module is capable of receiving input data, acting upon them, and producing output which may serve as input to one or more subsequent modules.

A cash-flow model of this type requires a substantial amount of data to produce meaningful results and many intermediate calculations are required. The subdivision of LODESTAR into ten modules is an effort to provide an efficient way to update data and to modify assumptions within the context of a single module, while retaining the integrated nature of the full model. A module may be operated upon without disturbing any other module or running the entire program.

Each module is capable of accepting data from external sources or from other modules. Communication among the several modules is accomplished through the mechanics of MULTIPLAN. LODESTAR runs in an interactive mode and user prompts are an important part of the operating system. Section 3 of this report provides instructions for running LODESTAR.

Currently, seven of the ten modules are fully operational:

- Management Policy Module -- Module 1

- Economic/Demographic Module -- Module 2
- Farebox Revenue Module -- Module 3
- Conventional Funding Module -- Module 5
- Operational Cost Module -- Module 7
- Capital Cost Module -- Module 9
- Cash Flow Management Module -- Module 10

The three non-functioning modules are the Control Systems (Module 4), Innovative Financing (Module 6), and Privatization (Module 8) Modules. Any information from these three modules which is needed to run LODESTAR must be input manually.

Figure 1 is a flowchart illustrating the current operation of LODESTAR. As additional components are completed, the flowchart will be adjusted. The data and schedules shown as input to the Management Policy Module are referred to collectively as Supporting Models. All input data and schedules currently are entered manually in Module 1 - the Management Policy Module, although certain assumptions about capital and operating funds can be changed in Module 10 - the Cash-Flow Management Module.

2.2 SUPPORTING MODELS

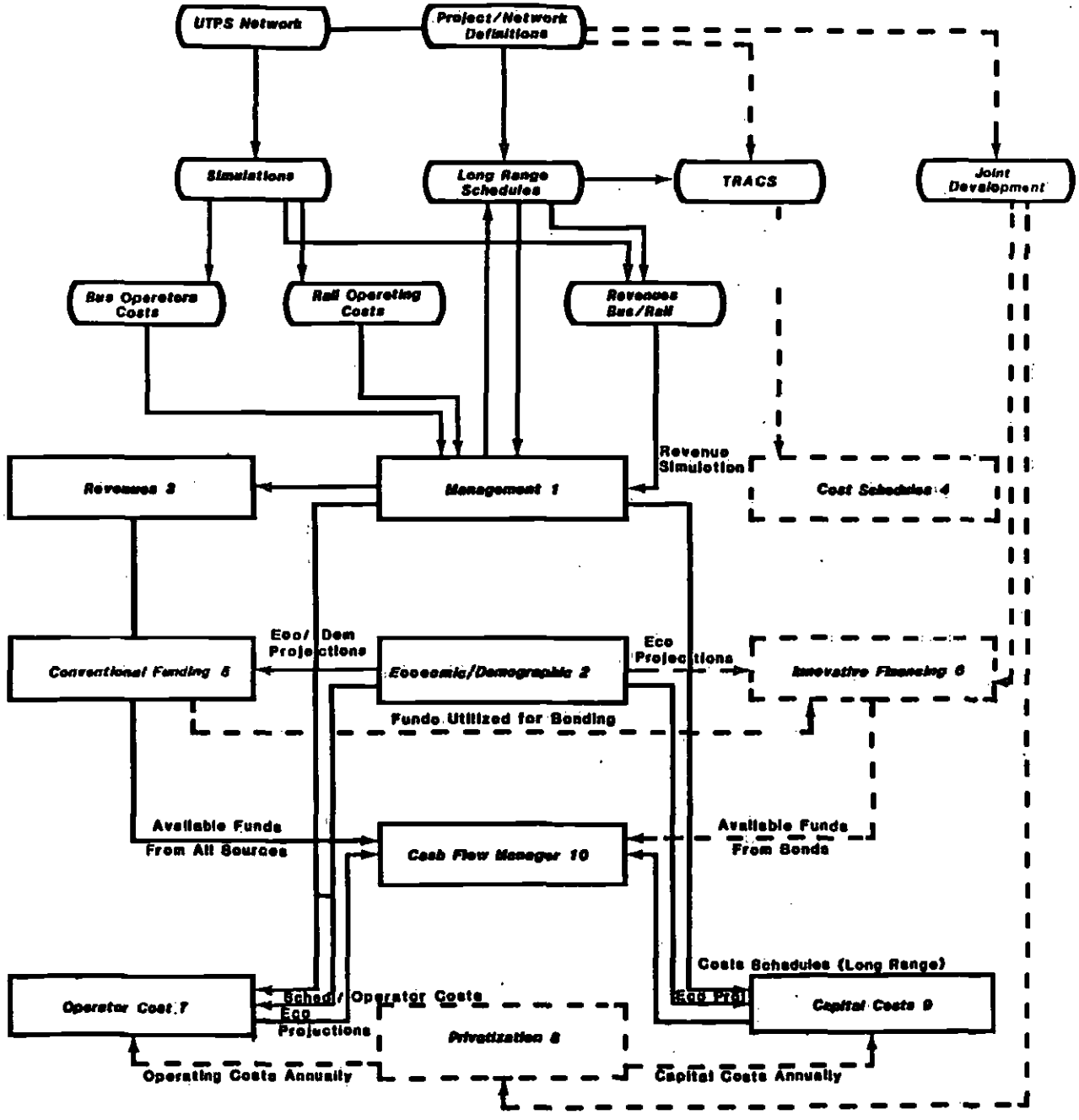
Supporting models consist of data sets and schedules which must be input to the Management Policy Module - the first module to be run. The cash-flow model works on an annual basis, accumulating capital, operating costs, and funding on a year-by-year basis; but most of the

external inputs are provided either as a total amount and the period of time over which the model must spread it, or as annual information for one or two specific years.

There are six data sets and schedules that the user must input, or change from the values provided in the master copy:

- o list of capital projects for implementation
- o implementation schedule for the capital projects
- o capital costs and construction time schedule (entered as a construction duration and implementation year) for each capital project
- o bus operating costs for two horizon years for each defined network
- o rail operating costs for two horizon years for each defined network
- o bus and rail farebox revenues for two horizon years for each defined network

Work Area 5
(LODESTAR)



A "defined network" consists of a set of implemented capital projects with the corresponding bus services to serve the projects and regional transit needs. When a new capital project is implemented, a new network comes into existence.

Regional trip tables exist for only a few selected years (currently, these are 1985, 1990, 2000, and 2010). Thus, if a defined network is expected to be implemented in, say, 1992 and be the regional network through 1996, UTPS simulations must be made for 1990 and 2000. This allows interpolation of the costs and revenues for years 1992 through 1996. In this case, 1990 and 2000 are referred to as the two horizon years for this defined network. The 1997 defined network may continue to exist until 2001, in which case the two horizon years for that network will also be 1990 and 2000. For such a network, interpolation would be made in LODESTAR for 1997 through 2000, with extrapolation to 2001.

Every defined network must have two horizon years, unless it will exist for one year only and that year is one of the trip-table years (i.e. 1985, 1990, 2000, or 2010). Interpolation and extrapolation are made on a straight-line basis. Also, extrapolation can be made by LODESTAR for only one year, currently.

2.2.1 List of Capital Projects for Possible Implementation

The list of capital projects consists of each major capital project that the user wishes to include as buildable within the time-frame

under consideration (e.g., 20 years, 30 years). A capital project may be a transit line or a line segment, provided that the project can be built in operable segments.

2.2.2 Implementation Schedule of Capital Projects

The implementation schedule for each of the transit capital projects or project segments identified in the long-range plan of 2.2.1 above is also input to the model. As each new project or segment comes into operation, a new transit network must be formulated and travel assignments projected for two horizon years through use of the Urban Transportation Planning System (UTPS). The implementation schedule consists of the year that each identified transit project or segment will be completed and put into operation.

2.2.3 Capital Costs and Construction Period

For each of the capital projects defined in section 2.2.1, the user must provide the duration of construction, a year in which construction is to end (i.e. the implementation year), and an estimated total capital cost. Currently, estimates of the capital costs are provided by LACTC and SCRTD staff and are loaded manually into Module 1. The construction schedule is open to user manipulation to see the effects of compressing or extending construction schedules. Application of the Transit Automated Control System (TRACS) provides information on rail segment construction schedules and other data which are input to the Control Systems Module. This module is

designed to generate rail capital cost data, but is not operational at this time.

2.2.4 Bus Operating Costs

Currently, bus operating costs are provided by a District mainframe computer program that is run together with the UTPS simulations. Bus operating costs can be obtained for two horizon years for each defined network, and these costs and years are input to the Management Policy Module.

2.2.5 Rail Operating Costs

Rail operating costs must be provided as an external input, currently. Rail operating costs may be obtained as estimates from SCRTD staff, or may be estimated from data in the Final Environmental Impact Statement if one exists. For other projects, the user must provide estimates of the costs. A rail operating cost model is under development for the Cash-Flow Model, but is not yet operational.

Data are required on rail operating costs for two horizon years for each defined network. Currently, rail operating costs are assumed to be the same in real dollars for each horizon year of a specific network. Unlike bus operating costs, significant changes are not anticipated in the year-to-year operation of a defined rail network that would change real costs of operation.

2.2.6 Bus and Rail Farebox Revenue

Bus and rail farebox revenues are obtained directly from UTPS simulations and related models. These operating revenues are the principal inputs for the Farebox Revenue Module. Revenues are to be obtained for two horizon years from the UTPS simulations. The Farebox Revenue Module will interpolate or extrapolate to obtain annual farebox revenue projections for each year that a defined network will be in operation.

2.3 MANAGEMENT POLICY MODULE

The Management Policy Module is the primary management framework through which broad policy scenarios are defined. It consists of:

a) the definition of transit corridors;
b) implementation priorities for the corridors; and
c) implementation dates for the corridors and bus support networks.

Corridors, and their implementation schedules and dates are the heart of LODESTAR and need to be defined before proceeding with other analyses. The Management Policy Module will provide information regarding operational transit systems, project descriptions, and project priorities.

Virtually all inputs to the Management Policy Module are external to

LODESTAR and are summarized in Section 2.2 -- Supporting Models. Outputs of this module are used by the Farebox Revenue Module, Operating Cost Module, and Capital Cost Module, and will be used by the Control System Module when it becomes operational. Capital cost data will be derived from the Control System Module rather than from the Management Policy Module,once the Control System Module becomes operational.

Figure 2 is a schematic of the Management Policy Module.

2.4 ECONOMIC/DEMOGRAPHIC MODULE

The Economic/Demographic Module generates the population and economic projections needed in several other modules. Inputs to the Economic/Demographic Module are external to LODESTAR.

Demographic data consist of Los Angeles County, California, and United States population projections through Year 2000. These data are used to calculate various ratios to determine the share of various fund categories for Los Angeles County.

Module 1

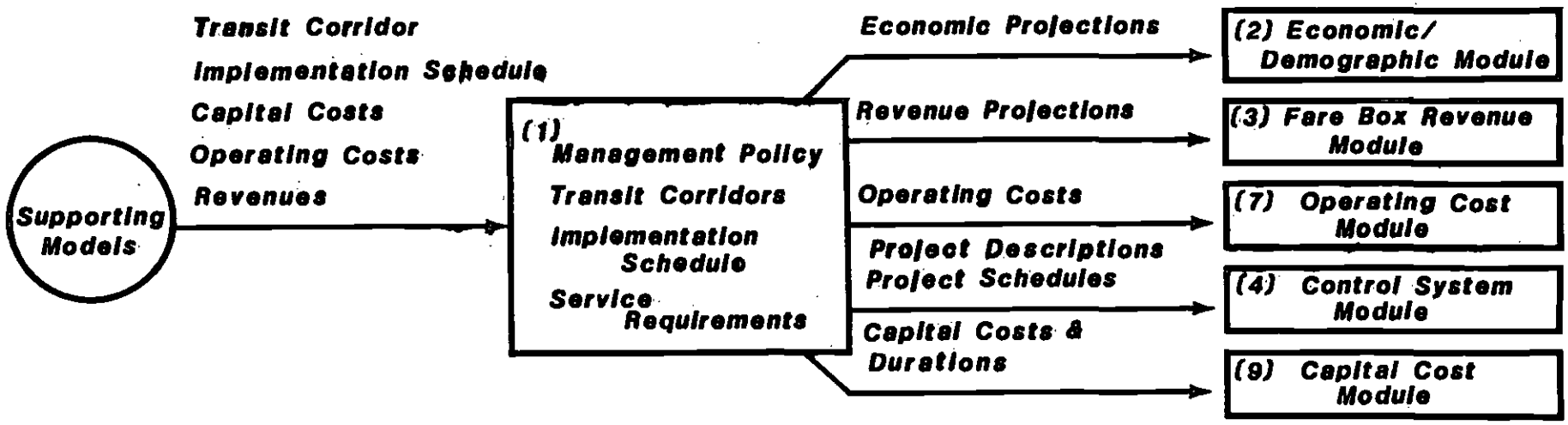


Figure 2: Management & Policy Module Input/Output Dependencies

The economic portion of the module incorporates a wide range of information needed to calculate various ratios and to determine the components of conventional funding for operations and capital expenditures. Examples of information required are: consumer price index projections; California highway construction index projections; Los Angeles and California per capita income projections; Los Angeles and California ratios of taxable sales transactions to personal income; gasoline price projections; gasoline and diesel fuel adjustments due to light duty vehicles; and projections of Los Angeles and California farebox revenues.

Once this module is run and the outputs saved, it is not necessary to run it again in the normal operation of LODESTAR. The exceptions, of course, include updates to these basic data derived from current observations or better projections, or user-generated changes to these data to investigate alternative futures.

The bulk of the output is directed to the Conventional Funding Module. Consumer price and construction cost index projections are used in the Farebox Revenue Module, the Capital Cost Module, and the Operating Cost Module, and will be used in the Innovative Financing Module when it becomes operational.

Figure 3 is a schematic diagram of the Economic/Demographic Module.

Module 2

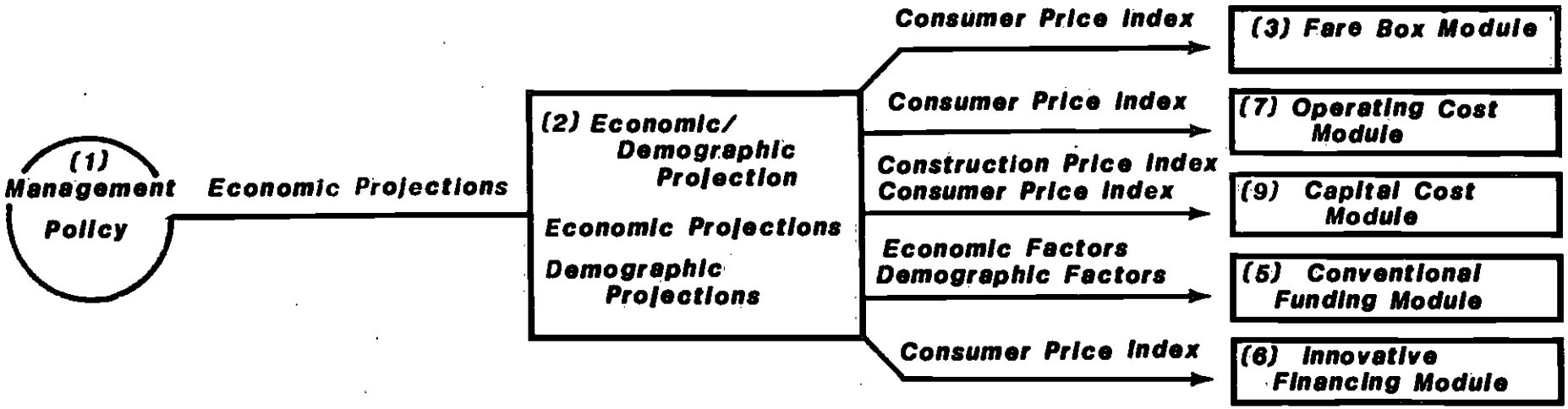


Figure 3: Economic/Demographic Module Input/Output Dependencies

2.5 FAREBOX REVENUE MODULE

The results of UTPS simulations include revenue projections for the bus, heavy rail, and light rail components for each of two horizon years. Two simulations are performed in UTPS for each defined network that results from an assumed implementation schedule.

The Farebox Revenue Module projects the annual farebox revenues for each defined network for each year that the network is expected to constitute the regional transit system. The years for which annual projections are required are determined from the established implementation schedule in the Management Policy Module. The projections are made by straight-line interpolation or extrapolation, as appropriate, of the two horizon years from the UTPS simulations. These projections are then factored by the annual consumer price index to provide revenue projections for the Conventional Funding Module.

Figure 4 is a schematic diagram of the Farebox Revenue Module.

Module 3

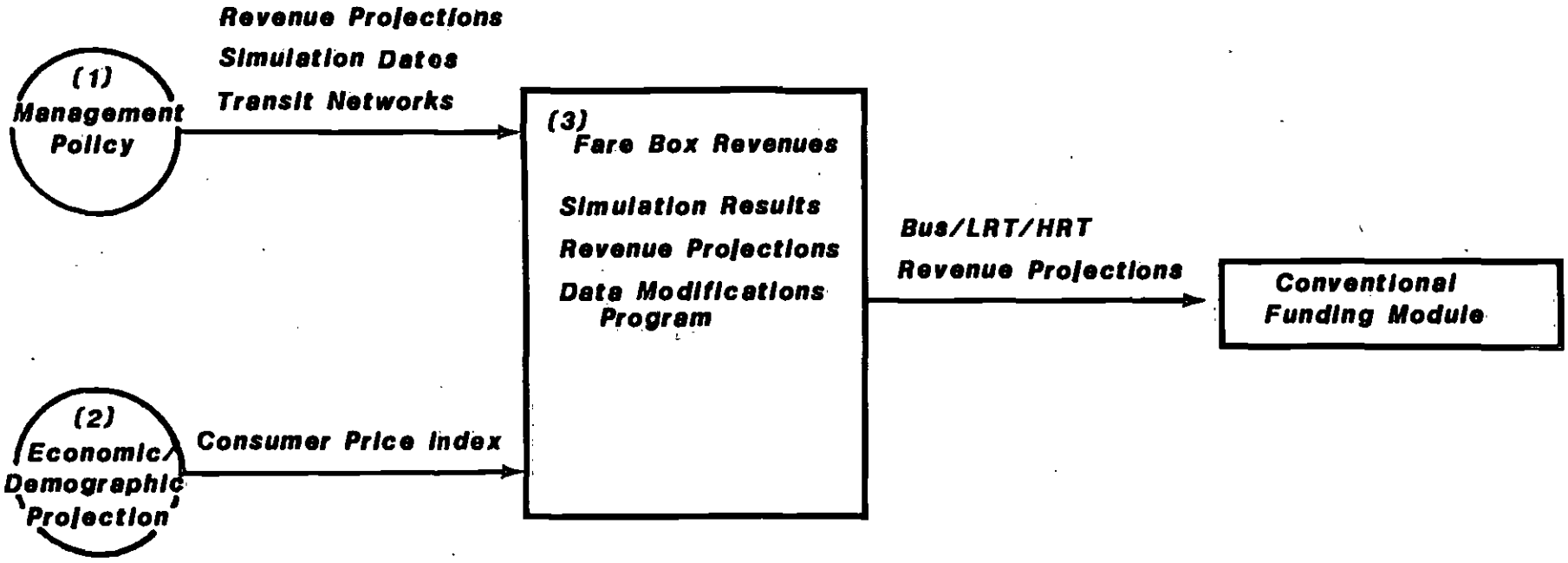


Figure 4: Fare Box Revenues Module Input/Output Dependencies

2.6 CONVENTIONAL FUNDING MODULE

The Conventional Funding Module calculates the annual value of all currently-known sources of funds for operating and building transit systems in Los Angeles County for the period for which the Cash-Flow Model is being run. These include both user-generated revenues resulting from operating the transit system and revenues from various taxes and other funds, designated for use in building or operating transit systems, (i.e., from federal, state, county, and municipal legislation and appropriations.

The quantity and allocation of funds are determined, in some instances, by direct application of formulae included in the legislation. In other instances, the quantity of funds is fixed; but the allocation of funds to several agencies is discretionary and is based on governmental policy and decisions.

Inputs to the Conventional Funding Module include outputs of the Economic/Demographic Module and revenue projections from the Farebox Revenue Module.

Outputs include yearly projections of:

a) available operating revenues and subsidies, and
b) sources of capital funds.

These data are used by the Cash Flow Management Module. In addition,

the Proposition A funds available for debt service will be assessed by the Innovative Financing Module when it becomes operational.

Figure 5 is a schematic diagram of the Conventional Funding Module.

2.7 OPERATIONAL COST MODULE

The results of UTPS simulations, related mainframe supporting models, and the micro-computer-based rail operating cost model include operating cost projections for the bus, heavy rail, and light rail components for each of two horizon years. These costs are currently input to the Management Policy Module. [Future developments are planned to place bus and rail operating-cost models in this module, internalizing the projection of these costs.]

This module performs a similar task to the Farebox Revenue Module by projecting annual operating costs for each year in which a defined network represents the regional transit system. Projections are made by straight-line interpolation or extrapolation, as appropriate, from the horizon years. Application of the consumer price index provides annual operating cost projections for input to the Cash Flow Management Module.

Figure 6 is a schematic diagram of the Operations Cost Module.

Module 5

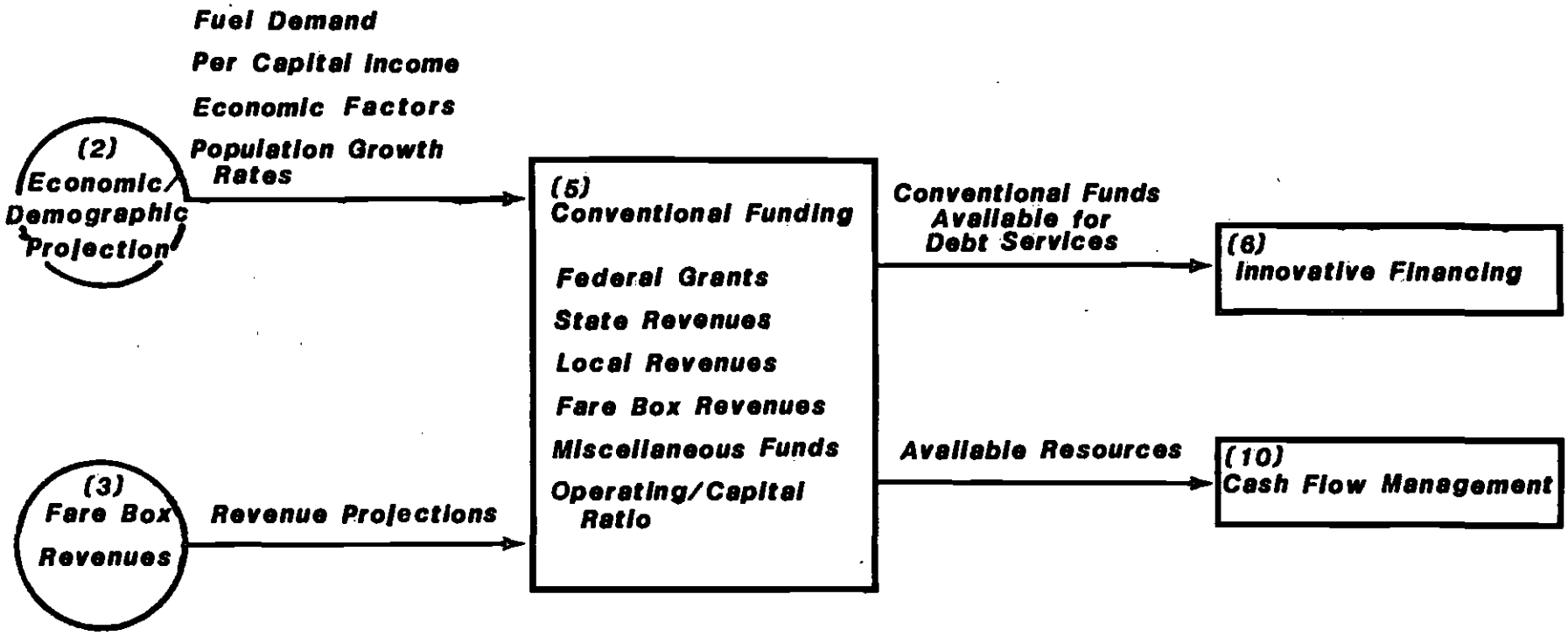


Figure 5: Conventional Funding Module Input/Output Dependencies

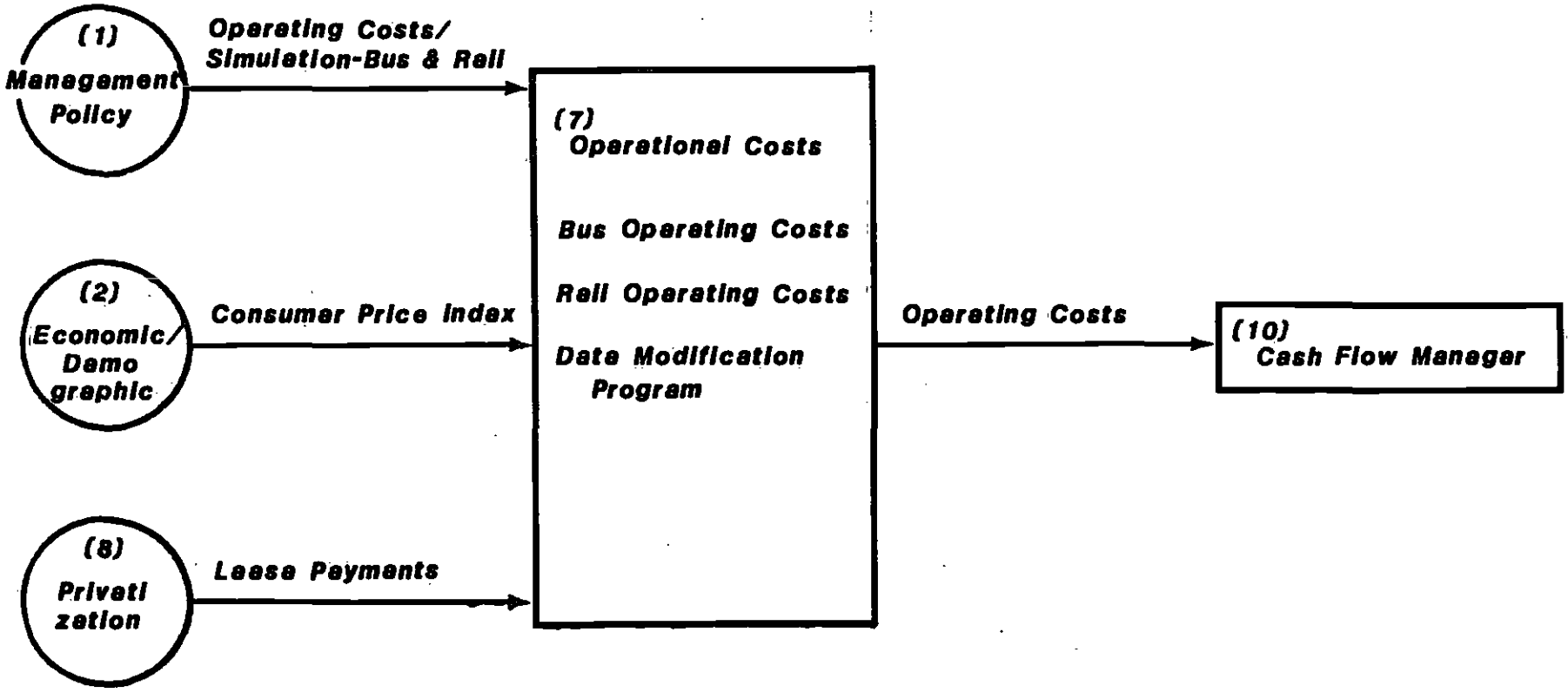


Figure 6: Operating Cost Module Input/Output Dependencies

2.8 CAPITAL COST MODULE

The Capital Cost Module generates a schedule of capital expenditures for bus systems, heavy rail, light rail, and any required buildings, land, and equipment. The major input to this module consists of the total project cost and construction duration of each of the transit capital projects or segments. Other inputs include the implementation schedule and the highway construction price index.

Annual estimates of capital expenditures are calculated for each project by multiplying the total cost by the annual percent completion schedule assumed for a given project duration. Application of the construction price index provides the capital cost projections for the Cash Flow Management Module.

Figure 7 is a schematic diagram of the Capital Cost Module.

2.9 CASH FLOW MANAGEMENT MODULE

The Cash Flow Management Module is the final step in LODESTAR. The module considers all projections of costs and revenues and all sources of grants and subsidies and calculates annual surplus or deficit cash flow for each of the years in the planning period.

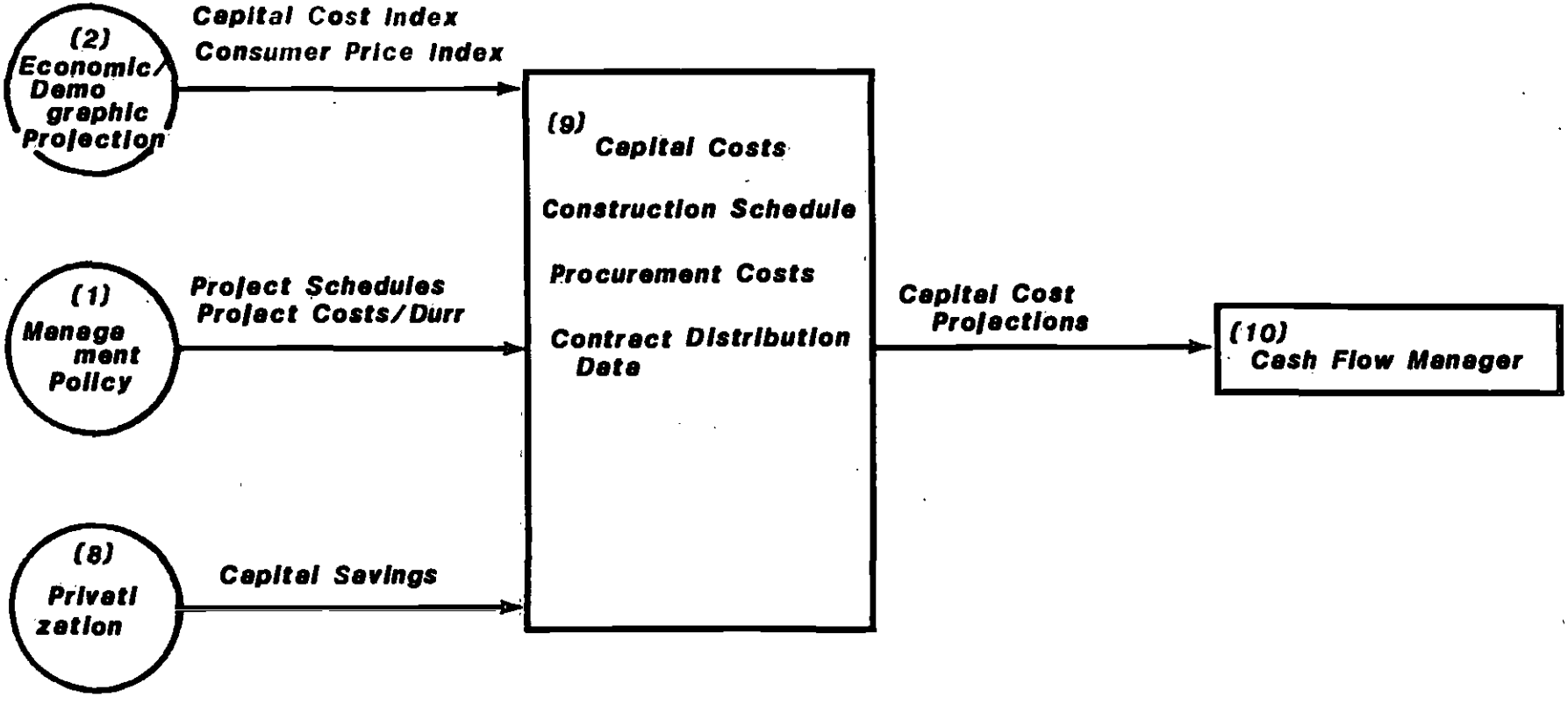


Figure 7: Capital Cost Module Input/Output Dependencies

The user of LODESTAR has the capability of altering management strategies, observing the impact of such changes on the cash flow, and aiding the development of optimal management strategies for the financial planning of the District's obligations.

Figure 8 is a schematic diagram of the Cash Flow Management Module.

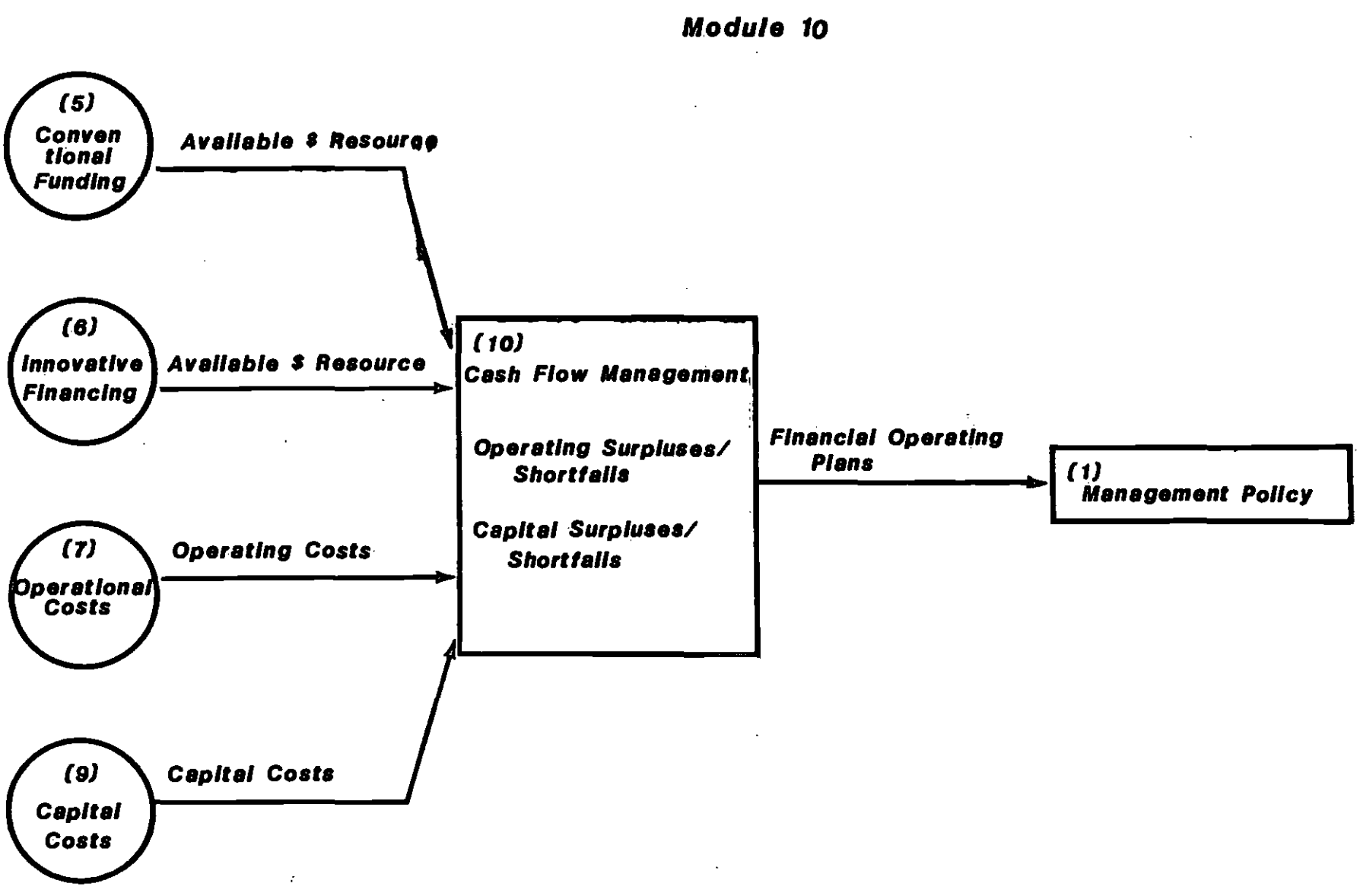


Figure 8: Cashflow Management Module Input/Output Dependencies

3. RUNNING LODESTAR

3.1 GETTING STARTED

To run LODESTAR, the user needs:

- This manual
- The MULTIPLAN Boot and System Disks
- The LODESTAR Master Disk (copy)
- Some blank disks
- An IBM-PC with two disk drives
- A user's manual for MULTIPLAN (IBM-PC Version)

Running LODESTAR is essentially the same as running MULTIPLAN. The user's manual for MULTIPLAN on the IBM PC should be consulted for detailed operating instructions.

The LODESTAR package consists of two sets of three write-protected disks: the MULTIPLAN Boot disk; the MULTIPLAN System disk; and the LODESTAR disk. DO NOT REMOVE THE WRITE-PROTECT TABS, OR YOU MAY ERASE MULTIPLAN OR THE CASH-FLOW MODEL. One set of disks should be filed as backups. A supply of blank formatted disks should be available for saving modified versions of the LODESTAR modules if desired. To create formatted blank disks, see the "Getting Started" section of the MULTIPLAN User's Manual.

The first step in running LODESTAR is to load the MULTIPLAN Boot disk.

If the user wishes to modify any of the modules, a working copy of the LODESTAR disk should be made before proceeding further. To do this, press the "ESC" key to access the MULTIPLAN utility functions. Select the copy disk function and follow instructions. Remove the MULTIPLAN Boot disk from drive A and insert the LODESTAR disk in that drive. Insert a blank disk in drive B. This second disk can be either an unformatted or a formatted disk.

When the LODESTAR disk has been copied on the disk in drive B, a message will appear requesting that the MULTIPLAN Systems disk be loaded. Remove the LODESTAR disk from drive A and insert the Systems disk in that drive. Press 'RETURN' to load the system. Be sure to leave the newly copied LODESTAR disk in drive B. An empty MULTIPLAN worksheet should be displayed at this point.

The default drive for reading and saving files now must be changed to drive B. However, the system disk should be left in drive A in the event that the user needs to access the 'Help' file at any time. The procedure to change the default drive follows:

a) Press 'T' for transfer
b) Press 'O' for options
c) Press 'Tab' to access setup
d) Press 'B' for drive B
e) Press 'RETURN' to the menu.

3.2 LOADING THE CASH-FLOW MODEL

LODESTAR is made up of a series of spreadsheets that are linked to each other in sequence. The sequence of spreadsheets is, therefore, very important. The spreadsheets are linked so that data entered in, say, the Management Policy Module can be used in other modules to recalculate the data in those modules. For recalculation to occur, it is necessary to load the module in which the recalculation is to take place. For example, farebox revenue is entered into Module 1 (Management Policy) for two horizon years. Module 3 (Farebox Revenue) calculates the annual amounts of farebox revenue from the two horizon years provided to Module 1. Therefore, if a change is made in the farebox revenue inputs for any defined network in Module 1, Module 3 must be reloaded for the annual revenue to be recalculated.

To load the Cash-Flow Model, the next step is to load the data from the Management Policy Module to the MULTIPLAN worksheet. The procedure follows:

a) Press 'T' for transfer;

b) Press 'L' for load;

c) Enter the filename 'MODULE1.INPUT' (note: the quote marks are not to be typed; the name must be typed exactly as shown with no spaces and with care to distinguish between '1' and 'I');

d) Press 'RETURN.'

The Management Policy module should now be displayed on the MULTIPLAN worksheet. The cell pointer is highlighted and may be moved to any cell by using the appropriate direction keys. Only a portion of the data is visible. The remainder may be observed by scrolling the worksheet, using either the direction keys or the 'GO TO' command.

If any changes in data are desired, they can be made by moving the cursor to the appropriate cell and following the procedure:

a) Type in the new data
b) Press 'RETURN'

The mechanics of MULTIPLAN result in the recalculation of all data elements in the worksheet to reflect the change just made. If only one data element in the module is to be changed, this presents no problem. However, if the user were to make six data changes, the worksheet would be recalculated six times, once after each change in data -- a time-consuming proposition.

A time-saving method is to suppress the recalculation mode. The procedure follows:

a) Press 'O' for options.
b) Press the space bar once to move the choice to 'NO' for the recalc option.
c) Press 'RETURN'.

After all changes to the module have been made, the revised worksheet must be saved to permit subsequent modules to access the revisions. The procedure follows:

a) Press 'T' for transfer.

b) Press 'S' for save.

c) Press 'RETURN' because the file name will not be changed.

d) Press 'Y' because the old file must be overwritten with the revised file.

This saves the recalculated Module 1 on the working copy of the Cash-Flow Module. If Drive B still contains the Master copy (write-protected) MULTIPLAN will tell the user that the revised spreadsheet cannot be saved on the write-protected disk. Because this save will replace the original version of Module 1, it should only be saved on a working copy disk created by the user for that purpose.

Note that the recalculation suppression need not be changed at this time. When the 'S' is pressed to save the file, all recalculations resulting from changed data will be made. This make take some time -- do not panic -- the machine will return control to the user after recalculating and saving the file. The user will know that recalculation is occurring by the reducing number displayed at the bottom left of the screen, which shows the number of cells remaining to be recalculated. When recalculation is finished, the B disk drive light will come on, showing that the module is being saved.

As each subsequent module is loaded, all linked input modules are read by MULTIPLAN. The data requested by the module being loaded are entered automatically from other saved modules and required calculations are made. LODESTAR does not allow the user to change those data that are input from other modules. For those data items not read from other modules, the user may choose to change input values. To do so, the procedure is the same as described above.

The file names for the modules are:

- o MODULE1.INPUT — Management Policy
- o MODULE2.INPUT — Economic/Demographic
- o MODULE3.INPUT — Farebox Revenue
- o MODULE5.INPUT — Conventional Funding
- o MODULE7.INPUT — Operational Costs
- o MODULE9.INPUT — Capital Cost
- o MODULE10.INPUT — Cash Flow Management

The modules MUST be accessed in numerical sequence. Initially, after entering changes in Module 1, the user should load and then save each of the other modules in strict numerical sequence, even if no changes are made to the direct inputs of the subsequent modules. The sequential loading and saving of each module allows LODESTAR to recalculate all appropriate values for input to Module 10, the Cash-Flow Manager.

After loading and saving each of the 7 modules, Module 10, the Cash-

Flow Manager, will be displayed with recalculated values for all entries the user has changed in earlier modules. Module 10 represents the cash-flow scenario for the implementation schedule, costs, revenues, and regional demographics that have been input. Use of this information is described in more detail in Chapter 4.

3.3 PRINTING A MODULE

Any module that has been loaded, while it remains in the workspace, may be printed as follows:

a) Press 'P' for Print
b) Press 'P' for Printer

It is necessary to use a 120-column printer. If changes have been made to the module, the file should not be printed until after the file has been saved, unless the user does not wish to save the changes and will not access any subsequent modules.

3.4 MAKING SELECTIVE CHANGES IN INPUTS

After proceeding through the steps in section 3.2 and 3.3, the user may wish to return to one of the earlier modules and make one or two selected changes in input values. For example, the implementation date of one transit capital project or project segment may be changed. In such a case, it is not necessary to reload and save every one of the modules.

Table 1 shows the input values that the user can change and which modules must be reloaded and saved, if that change alone is made. The Table does not specify other calculations that would have to be made outside the Cash-Flow Model, such as rerunning UTPS simulations; however, the user should be aware that many of these changes in input values may require other recalculations to be made outside the Cash-Flow Model.

TABLE 1

MODULES THAT MUST BE RELOADED FOR SPECIFIC USER CHANGES

USER-SPECIFIED INPUT	MODULE NUMBERS AND SEQUENCE TO RELOAD AND SAVE
Defined Network (Implemented Capital Projects plus Supporting Bus Service)	1, 3, 5, 7, 9, 10
Inclusion of a New Capital Project, or Exclusion of a Listed Capital Project	1, 3, 5, 7, 9, 10
Change in Implementation Year for a Capital Project	1, 3, 5, 7, 9, 10
Change in Capital Cost of a Project	1, 9, 10
Change in Construction Period without changing Implementation Year	1, 9, 10
Change in Bus Operating Cost for a Horizon Year	1, 7, 10
Change in Rail Operating Cost for a Horizon Year	1, 7, 10
Change in Farebox Revenue for a Horizon Year	1, 3, 10
Change in a Regional Economic/ Demographic Forecast	1, 2, 5, 10
Changes in Assumed Discretionary Funds	10

4. MANAGEMENT USES OF LODESTAR

Some probable uses of LODESTAR are presented in this section. In general, changes will be made in the information in the Management Policy module, which specifies project implementation schedule, costs, and farebox revenues. Changes also may be made in key data items in other modules.

4.1 MANAGEMENT POLICY INPUTS

Policy inputs regarding project implementation are made in the Management Policy module. To make changes, this module should be loaded ('TRANSFER', 'LOAD', 'MODULE1.INPUT').

As shown in Figure 9, the management module includes lists of heavy rail, light rail and busway projects. Within the three groups the individual projects are listed in chronological order of implementation. If changes are made in this chronology, new UTPS travel simulations will be required to generate appropriate cost and farebox data, and these data input to this Module.

Policy variables that may be modified include scheduled implementation date (the year the project system will be fully operational) and the duration of the implementation program (DURR). The range of implementation dates is limited by the dates for which travel simulations are available (see SIMULATION DATES in the module). Selected implementation dates must fall between the years for which

simulations are available, i.e. no earlier than one year before the first simulation date or no later than one year after the date of the later simulation. For example, simulations are available for MOS-2 for the years 1990 and 2000. Therefore, an implementation date between 1989 and 2001 inclusive may be selected. There is no such limitation on the lengths of the duration for implementation of the projects. These or any other variables in any module may be changed by moving the cursor to the cell containing the data to be changed, typing in the new data and pressing the return key. If the change is to be retained for future use, the user should save the file ('TRANSFER', 'SAVE') on the blank disk.

Changes in implementation dates and durations allow the manager to review the cash flow implications of speeding up or delaying implementation of individual projects or of shortening or lengthening the construction program.

The operating and capital costs components of this Management Policy module also may be modified as new information becomes available from project engineers or travel forecasters. Changing these data allows the manager to assess the implications of changes in costs on the cash-flow position of the District. Farebox revenue projections also may be changed to reflect changes in fare policy or ridership projections.

Figure 9

MODULE1: MANAGEMENT POLICY

THE FOLLOWING TRANSPORTATION IMPROVEMENTS HAVE BEEN IDENTIFIED FOR INCLUSION IN THE LONG RANGE PLAN

HEAVY RAIL DESC	EST COST	DURR	LIGHT RAIL DESC	EST COST	DURR	BUSWAY DESC	EST COST	DURR
MOS-1	871	4	LB-LA	427.2	5	HARBOR	200	3
MOS-2	336.5	5	CENTURY	133	4			
MOS-3	336.5	5	SF VALLEY	311	3			
MOS-4	462.35	5	COASTAL	170	3			
MOS-5	462.35	5	HUNTINGTON	300	3			
EAST LA METRO	0	5	PASADENA *	296	4			
NORWALK METRO *	0	5	TORRANCE *	160	3			
SANTA MONICA *	0	6						

THE FOLLOWING IMPROVEMENTS HAVE BEEN INCORPORATED INTO THE IDENTIFIED NETWORKS

SCHEDULED IMPLEMENTATION	NETWORK DESIGNATION/DESCRIPTION	SIMULATION DATES		OPERATING COSTS						REVENUE PROJECTIONS					
				BUS		METRO		LRT		BUS		METRO		LRT	
		SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2
84 FISCAL YEAR	NW1 = ALL BUS SYSTEM	85	90	434.37	483.50	0.00	0.00	0.00	0.00	224.85	252.71	0.00	0.00	0.00	0.00
91 FISCAL YEAR	NW2 = MOS1 LB-LA	90	100	415.48	506.38	16.00	16.00	13.20	13.20	253.75	304.01	8.65	10.59	14.28	17.45
92 FISCAL YEAR	NW3A= NW2 MOS2	90	100	394.44	480.84	24.53	24.53	13.20	13.20	250.65	300.30	11.16	22.35	18.42	22.51
94 FISCAL YEAR	NW3 = NW3A MOS3 CENT	90	100	373.48	455.29	33.05	33.05	20.80	20.80	236.75	296.58	13.67	34.11	22.56	27.57
99 FISCAL YEAR	NW4A= NW3 MOS4	90	100	357.81	436.18	41.65	41.65	20.80	20.80	236.67	296.48	16.87	42.09	29.69	34.29
102 FISCAL YEAR	NW4 = NW3 MOS5 SF VALLEY	100	110	342.13	417.06	50.25	50.25	29.00	29.00	236.59	296.38	20.06	50.06	36.82	45.00
105 FISCAL YEAR	NW5 = NW4 HARBOR COSTAL	101	110												
110 FISCAL YEAR	NW6 = NW5 EAST LA HUNTINGTON	100	110												

NETWORK I.D. — FISCAL YEAR

	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110
NETWORK 1	X					X																				
NETWORK 2						X										X										
NETWORK 3A						X										X										
NETWORK 3						X										X										
NETWORK 4A						X										X										
NETWORK 4																X										X
NETWORK 5																X										X
NETWORK 6																X										X

The graphic in the bottom half of the Management Policy module is a visual representation of project chronology and implementation dates and will show if acceptable parameters have been exceeded. Dashed lines should fall within the guidelines discussed above for scheduled implementation. The 'X's in the graphic indicate horizon years, for which trip tables exist and UTPS simulations may be made.

4.2 ECONOMIC/DEMOGRAPHIC PROJECTIONS

Economic and demographic projections are contained in the second module (Figure 10). The left-most entry on each row indicates the source of the data in that row. This module includes base data that are used by other modules for calculating available revenues and inflated costs and revenues. Generally, these data should not be modified, unless new regional forecasts have been adopted, or other major informational changes have occurred that affect the module.

A manager may, however, wish to review the implications of changes to certain basic assumptions in this Module. For example, the user may want to review the effects on future year costs and revenues of the consumer price index (CPI-U) or the highway construction index growing at a faster or slower rate than assumed. The numbers currently in the module may be changed by moving the cursor to the number, typing in the new figure and pressing the return key. Again, this file should be saved on a new disk, not on the LODESTAR disk. Gasoline prices and the farebox revenues may be changed in this module; but, in reality, any minor modifications would have relatively little impact on

revenues available to the District.

4.3 OTHER CAPITAL COSTS

The Capital Costs module spreads rail and busway capital costs (input from the Management Policy module) over the duration specified in that module. Costs are spread using a construction cost distribution curve (CONTRACT DISTRIBUTION DATA), which is based on CALTRANS data. The user may want to modify the curve if better information is available. For example, a project with a three year duration is assumed to incur obligations of 35.1%, 43.9%, and 21% in each of the three years, respectively. The user could change these numbers to reflect new data on expenditures (rather than obligations) or on the yearly percentages.

Capital costs for bus acquisition, buildings, office equipment, and land are input manually to the module. The information may come from the current five-year plan and estimates for the future made by SCRTD staff. The user may want to modify these inputs based on updated information or to test the implications of different scenarios for purchases in these categories.

Figure 10

MODULE 2 ECONOMIC/DEMOGRAPHIC PROJECTIONS

	FISCAL YEAR		1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	INPUT																		
	POPULATION																		
--->SCAG	L.A. CO. POPULATION, CY	000s	7847	7911	7955	7998	8040	8081	8121	8161	8200	8237	8276	8311	8346	8381	8415	8449	8481
--->SCAG	L.A. CO. POPULATION, FY	000s	7752	7889	7933	7976.5	8019	8060.5	8101	8141	8180.5	8218.5	8256.5	8293.5	8328.5	8363.5	8398	8432	84..
--->SCAG	L.A. CO. POPULATION GROWTH RATE	%		1.77	0.56	0.55	0.53	0.52	0.50	0.49	0.49	0.46	0.46	0.45	0.42	0.42	0.41	0.40	0.39
--->DOF	CA. POPULATION, CY	000s	25598	26020	26430	26834	27236	27639	28014	28399	28754	29113	29477	29820	30150	30474	30792	31104	31414
--->DOF	CA. POPULATION, FY	000s	25219	25809	26225	26633	27038	27433	27822	28202	28577	28934	29295	29649	29985	30312	30633	30949	31260
--->DOF	CA. POPULATION GROWTH RATE	%		2.34	1.61	1.56	1.52	1.47	1.42	1.38	1.31	1.25	1.25	1.21	1.13	1.09	1.04	1.03	1.00
--->USDOC	U.S. POPULATION, CY	000s	235404	237556	239679	241771	243835	245863	247862	249830	251764	253669	255540	257379	259184	260940	262701	264410	266087
--->USDOC	U.S. POPULATION, FY	000s	234313	236480	238618	240725	242803	244849	246863	248844	250798	252718	254605	256440	258283	260073	261831	263556	265249
--->USDOC	U.S. POPULATION GROWTH RATE	%		0.92	0.90	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.75	0.73	0.71	0.69	0.68	0.66	0.64
--->DOF	OTHER PROP 5 CO. POPULATION, FY	000s	10211	10449	10618	10783	10946	11107	11264	11420	11570	11714	11861	12004	12140	12273	12402	12530	12656
--->DOF	OTHER PROP 5 CO. POP GRWTH RATE	%		2.34	1.61	1.56	1.50	1.47	1.42	1.38	1.31	1.25	1.25	1.21	1.13	1.09	1.04	1.03	1.00
	PRICE INDICES																		
--->CAL	U.S. CPI-U	1984=100	100.00	104.86	110.56	117.45	124.77	132.20	139.14	147.21	155.46	163.69	172.70	182.20	192.22	202.79	213.94	225.71	238.12
--->CAL	U.S. CPI-U GROWTH RATE	%		4.9	5.4	6.2	6.2	6.0	5.2	5.8	5.6	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
--->CAL	U.S. CPI-U	1967=100	304.00	319.60	337.00	358.00	380.30	403.20	424.10	448.20	472.93	498.94	526.30	555.33	585.88	618.10	652.10	687.96	725.80
--->CAL	CA. NWY CONSTRUCTION INDEX	1984=100	100.00	106.00	112.36	120.23	128.64	137.65	147.28	158.77	170.52	183.31	197.05	211.83	227.72	244.80	263.16	282.98	304.11
--->CAL	CA. HCI GROWTH RATE	%		6.0	6.0	7.0	7.0	7.0	7.0	7.0	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
	REAL PERSONAL INCOME/CAPITA																		
--->SCAG	L.A. REAL PERSNL INCOME/CAPITA	$,1967	4769	4845	4935	5010	5052	5133	5201	5264	5333	5382	5433	5489	5570	5655	5741	5829	5918
--->SCAG	L.A. REAL PERSNL INCM/CAP GRWTH	%		1.60	1.85	1.52	0.84	1.61	1.31	1.22	1.32	0.92	0.95	1.03	1.48	1.52	1.53	1.53	1.53
--->CAL	CA. REAL PERSNL INCOME/CAPITA	$,1967	4554	4628	4720	4795	4835	4921	4980	5032	5123	5171	5223	5280	5365	5451	5539	5628	5719
--->CAL	CA. REAL PERSNL INCM/CAP GRWTH	%		1.62	1.99	1.59	0.83	1.78	1.36	1.28	1.41	0.94	1.01	1.09	1.61	1.61	1.61	1.61	1.61
--->CAL	CA. PERSNL INCOME/CAP GRWTH	%		6.54	7.54	7.92	7.12	7.91	6.62	7.14	6.88	6.49	6.56	6.65	7.20	7.20	7.20	7.20	7.20
	TAXABLE SALES COEFFICIENTS																		
--->SCAG	L.A. TXBL SALES/PERSNL INCM			0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320	0.5320
--->SCAG	CA. TXBL SALES/PERSNL INCM			0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511	0.5511
	GASOLINE PRICES																		
--->CAL	CA. GASOLINE REAL PRICE	$/GAL;FY84	1.14	1.09	1.04	1.06	1.06	1.08	1.10	1.12	1.14	1.16	1.17	1.19	1.23	1.27	1.31	1.35	1.39
--->CAL	CA. GASOLINE PRICE	$/GAL;1	1.14	1.14	1.15	1.25	1.33	1.43	1.54	1.66	1.77	1.89	2.03	2.17	2.36	2.57	2.79	3.04	3.31
--->CAL	CA. GAS REAL PRICE GRWTH RATE	%		-4.28	-4.47	1.75	0.29	1.72	1.97	1.93	1.36	1.34	1.58	1.54	3.16	3.16	3.16	3.16	3.16
	VEHICLE MILES TRAVELED																		
--->CAL	CA. LDV VMT/Capita Index	FY84=100	100	101.14	102.54	103.69	104.29	105.59	106.68	107.55	108.61	109.32	110.09	110.93	112.18	113.45	114.73	116.02	117.33
--->CAL	CA. LDV VMT/CAPITA GRWTH RATE	%		1.14	1.39	1.11	0.58	1.25	0.95	0.78	0.98	0.66	0.70	0.76	1.13	1.13	1.13	1.13	1.13
--->CAL	CA. Commercial Fleet Index	FY84=100	104	107.7	111.5	115.6	119.7	124.44	123.18	124.88	126.52	128.10	129.70	131.27	132.76	134.28	135.63	137.02	138.40
--->SCAG	CA. COM'L FLT INDEX GRWTH RATE	%		3.56	3.53	3.68	3.55	3.47	3.42	1.38	1.31	1.25	1.25	1.21	1.13	1.09	1.04	1.03	1.00
	FUEL DEMAND																		
--->CAL	CA. NEW LDV FUEL EFFICIENCY	MPG	23.70	22.89	22.07	22.38	22.43	22.74	23.18	23.46	23.71	23.96	24.27	24.57	25.18	25.88	26.44	27.18	27.72
--->CAL	CA. NEW LDV FUEL EFFCY GR RATE	%		-3.42	-3.58	1.40	0.23	1.38	1.88	1.55	1.08	1.07	1.27	1.25	2.48	2.48	2.48	2.48	2.48
--->CEC	CA. AVG LDV FUEL EFFICIENCY	MPG	14.48	17.31	17.98	18.59	19.13	19.69	20.12	20.59	21.02	21.44	21.83	22.22	22.63	23.07	23.55	24.06	24.57
--->CEC	CA. AVG LDV FUEL EFFCY GR RATE	%		5.56	3.85	3.43	2.89	2.44	2.27	2.32	2.12	1.96	1.85	1.74	1.87	1.96	2.04	2.11	2.17
--->CAL	CA. LDV FUEL DEMAND	MIL GALS	10539	10453	10372	10297	10218	10227	10219	10216	10234	10250	10241	10244	10305	10332	10347	10353	10350
--->CAL	CA. TRUCK FUEL DEMAND	MIL GALS	1773	1834	1901	1971	2041	2071	2108	2129	2157	2184	2211	2238	2263	2288	2312	2336	2359
--->CAL	FUEL TYPE ADJUSTMENT FACTOR	MIL GALS	422	418	415	412	409	409	409	409	409	409	410	411	412	413	414	414	414
	U.S. GASOLINE ADJUSTMENT FACTOR			1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173	1.0173
	U.S. DIESEL ADJUSTMENT FACTOR			1.229	1.229	1.229	1.229	1.229	1.229	1.229	1.229	1.229	1.229	1.229	1.229	1.229	1.229	1.229	1.229
	FARE BOX REVENUES																		
--->SCAG	L.A. CO FAREBOX REVENUES	$MIL;1		114.8	128.5	224.4	289.1	338.8	345.5	373.7	400.4	430.8	463.2	493.9	534.4	574.1	616.4	661.4	709.8
--->SCAG	L.A. CO REAL FAREBOX REVENUES	$MIL;1984		111.4	141.4	192.9	226.5	254.1	240.3	253.2	258.2	263.2	268.2	272.2	278.1	283.1	288.1	293.1	298.1
--->SCAG	CA. FAREBOX REVENUES	$MIL;1	442.7	489.7	738.9	797.2	859.7	924.8	986.5	1050.2	1130.8	1207.8	1289.3	1376.4	1460.8	1544.5	1630.2	1720.2	1817.8
--->SCAG	CA. REAL FAREBOX REVENUES	%		7.31	7.14	7.88	7.84	7.58	6.48	7.26	6.78	6.82	6.82	6.77	6.78	6.65	6.42	6.59	6.56
	OUTPUT																		
	L.A. CO TXBL TRANSACTIONS	$BIL;1		64	69	75	81	87	94	101	108	116	124	133	142	153	165	177	190
	CA. TAXABLE TRANSACTIONS	$BIL;1		205	224	244	270	293	318	346	374	405	437	471	508	551	597	647	700
	SCRTD/L.A.CO SUBSIDY SHARE			0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
	CA. GASOLINE SALES	MIL GALS	10781	10873	10787	10709	10627	10634	10627	10625	10644	10639	10651	10674	10717	10745	10781	10767	10744
	CA. DIESEL SALES	MIL GALS		1418	1484	1559	1632	1661	1691	1720	1749	1775	1802	1822	1851	1875	1898	1922	1945
	U.S. GASOLINE SALES	MIL GALS		101351	99845	98449	97091	96576	95929	95355	95029	94534	94169	93930	93910	93786	93571	93278	92919
	U.S. DIESEL SALES	MIL GALS		16614	17293	18021	18745	18947	19193	19412	19614	19826	20025	20216	20393	20572	20752	20933	21113
	CA. GASOLINE PRICE	$,1		1.14	1.15	1.25	1.33	1.43	1.54	1.66	1.77	1.89	2.03	2.17	2.36	2.57	2.79	3.04	3.31
	PROP 5 CO.POP/CA POP COEFF			0.7105	0.7074	0.7044	0.7015	0.6987	0.6961	0.6935	0.6911	0.6889	0.6867	0.6846	0.6826	0.6808	0.6790	0.6773	0.6757
	SCRTD OPR REV//CA OPR REV COEFF			0.1694	0.2415	0.2892	0.3250	0.3643	0.3502	0.3522	0.3545	0.3569	0.3592	0.3613	0.3639	0.3665	0.3690	0.3716	0.3742
	L.A.CO POP/CA POP COEFF			0.3057	0.3025	0.2995	0.2964	0.2938	0.2912	0.2886	0.2863	0.2840	0.2818	0.2797	0.2778	0.2759	0.2741	0.2724	0.2708
	LA CO POP/OTHR PROPS CO POP COEF			0.4302	0.4276	0.4252	0.4228	0.4205	0.4183	0.4162	0.4142	0.4123	0.4104	0.4086	0.4069	0.4053	0.4037	0.4022	0.4008
	TP&D SALES TAX CAP GROWTH RATE	%		7.31	7.14	7.88	7.84	7.58	6.48	7.26	6.78	6.82	6.82	6.77	6.78	6.65	6.42	6.59	6.56

4.4 CASH FLOW MANAGER

The Cash Flow Manager (Figure 11) provides a summary of all District revenues and costs. It compares costs and revenues on an annual basis and produces an annual and cumulative cash balance position.

This module and the Management Policy module are the two most likely areas for user modifications in LODESTAR. This module is the best place to test alternative revenue scenarios. Revenues are listed in the top two sections of the module. The year-by-year listings show the assumed annual revenues.

Assumptions are incorporated in the model for funds from discretionary sources. These amounts may vary substantially, so this module enables different scenarios to be evaluated quickly (a few seconds to a few minutes). Federal funding also is highly variable, and the impacts of alternative futures may be evaluated easily by manually changing the revenue inputs in the module. For example, the model currently assumes that UMTA Section 9 assistance will end in 1988 and that UMTA Section 3 funding will be distributed in the future on a population formula basis to urbanized areas greater than 1 million people. Other assumptions may be made and tested by entering alternative dollar values in appropriate locations. Other discretionary revenues that could be varied include the three categories of Proposition A funds.

	FISCAL YEAR		1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	RTD OPERATING SUBSIDIES																		
---) 5	PROPA 40% DISC	$MIL,I		104.0	106.0	114.2	124.0	135.4	145.5	156.7	168.0	180.5	193.0	206.5	221.1	237.7	255.4	274.9	295.6
---) 5	TDA 95% REGNL FORMULA (85%)	$MIL,I		102.9	111.5	121.3	131.4	141.4	151.9	163.4	175.4	188.4	201.5	215.8	230.8	248.1	266.9	287.0	308.5
---) 5	STA REMAINING ALLOCATION	$MIL,I		10.1	9.2	4.5	1.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---) 5	SECTION 9:OPERATING	$MIL,I		47.4	47.3	47.3	14.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---) 5	FARE BOX REVENUES	$MIL,I		112.4	195.9	249.5	301.4	324.9	351.4	415.5	455.0	490.4	530.3	575.0	623.1	674.4	730.0	825.4	892.4
---) 5	AUX REV/LOCAL OPR CONTRIBUTIONS	$MIL,I		2.6	2.8	2.9	3.1	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2
---) 5	NON TRANSIT REVENUES	$MIL,I		16.0	16.0	17.0	17.0	18.0	18.0	18.0	19.0	19.0	19.0	20.0	20.0	20.0	21.0	21.0	21.0
	CAPITAL FUNDING																		
---) 5	TDA 95% REGIONAL FORMULA (15%)	$MIL,I		18.2	19.7	21.4	23.2	25.0	26.8	28.9	31.0	33.2	35.6	38.0	40.7	43.8	47.1	50.6	54.5
---) 5	STA METRORAIL SET ASIDE	$MIL,I		6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---) 5	SECT 9 METRORAIL SET ASIDE	$MIL,I		20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---) 5	SECT 9:REMAINING FOR CAPITAL	$MIL,I		38.8	38.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---) 5	BENEFIT ASSESSMENT DISTRICT	$MIL,I		68.0	25.0	25.0	20.3												
---) 5	PROPA 35% RAIL PROGRAM	$MIL,I		0.0	114.4	120.5	135.0	145.1	155.8	167.9	180.0	193.3	206.7	221.2	236.7	254.5	273.0	294.4	314.4
---) 5	PROPA 25% LOCAL RETURN TO L.A.	$MIL,I		29.4	31.9	34.7	37.6	40.4	43.4	46.8	50.1	53.8	57.6	61.4	66.0	70.9	76.3	82.0	88.2
---) 5	GOLDY 50% POP FORMULA LACTC DISCR	$MIL,I		21.6	21.4	21.2	21.0	20.8	20.7	20.5	20.4	20.3	20.2	20.2	20.1	20.1	20.0	19.9	19.8
---) 5	GOLDY 50% CTC DISCR	$MIL,I		50.3	50.0	49.8	49.4	49.5	49.4	49.3	49.4	49.3	49.3	49.3	49.4	49.5	49.5	49.5	49.5
---) 5	SECT 3 TO LA (UZA W/POP)1M ONLY)	$MIL,I		132.8	132.8	138.1	137.3	137.8	136.5	136.1	135.9	135.6	135.4	135.3	135.5	135.6	135.5	135.4	135.2
---) 5	SECT 3 TO LA (SEC 9&10 FORMULA)	$MIL,I		46.9	46.9	48.8	48.5	48.4	48.2	48.0	48.0	47.9	47.8	47.8	47.8	47.9	47.9	47.8	47.7
	OPERATING COSTS																		
---) 7	OPERATING COSTS (BUS)	$MIL		455.5	491.1	533.3	578.7	624.6	672.7	624.9	638.8	688.1	701.5	755.0	812.2	873.5	939.1	966.8	1038.4
---) 7	OPERATING COSTS (HEAVY RAIL)	$MIL		0.0	0.0	0.0	0.0	0.0	0.0	23.6	38.1	40.1	57.1	60.2	63.5	67.0	70.7	94.0	99.2
---) 7	OPERATING COSTS (LIGHT RAIL)	$MIL		0.0	0.0	0.0	0.0	0.0	0.0	19.4	20.5	21.4	35.9	37.9	40.0	42.2	44.5	46.9	49.5
	CAPITAL COSTS																		
---) 9	BUS ACQUI/REPL/BUSWAY CONSTR	$MIL		3.0	32.4	35.2	58.4	8.0	48.6	15.8	55.4	88.9	95.2	112.5	72.7	110.7	104.9	113.5	120.1
---) 9	METRORAIL	$MIL		104.2	534.7	358.3	220.1	287.0	244.5	202.7	108.4	57.4	144.7	284.0	281.1	396.1	446.0	349.2	245.7
---) 9	LIGHT RAIL TRANSIT	$MIL		0.0	77.3	148.9	146.7	111.1	103.4	76.9	62.4	32.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---) 9	BUILDINGS/EQUIP/LAND	$MIL		42.8	32.4	32.8	41.9	30.3	34.9	37.5	40.3	43.3	46.7	50.1	53.9	58.0	62.3	67.0	72.0

ASSUMPTIONS: PROP A RAIL PROGRAM ; SET ASIDE FOR METRORAIL (LACTC COMMITMENT)
FED GENERAL FUND PHASE OUT
1 CENT FED FUEL TAX TO SECT 3;DISTRIBUTED TO UZA'S) IN
100% DISCR GUIDEWAY FUND THRU FY89

A. OPERATING COSTS AND REVENUES

I. OPERATING COSTS

METRO OPERATING COSTS	0.0	0.0	0.0	0.0	0.0	0.0	23.6	38.1	40.1	57.1	60.2	63.5	67.0	70.7	94.0	99.2
LIGHT RAIL OPERATING COSTS	0.0	0.0	0.0	0.0	0.0	0.0	19.4	20.5	21.4	35.9	37.9	40.0	42.2	44.5	46.9	49.5
BUS OPERATING COSTS	455.5	491.1	533.3	578.7	624.6	672.7	624.9	638.8	688.1	701.5	755.0	812.2	873.5	939.1	966.8	1038.4
TOTAL OPERATING COSTS	455.5	491.1	533.3	578.7	624.6	672.7	667.9	697.4	749.9	794.5	853.1	915.8	982.7	1054.3	1107.8	1187.3

II. OPERATING REVENUES

FARE BOX REVENUES	112.4	195.9	249.5	301.4	324.9	351.4	415.5	455.0	490.4	530.3	575.0	623.1	674.4	730.0	825.4	892.4
AUX REV/LOCAL OPR CONTRIBUTIONS	2.6	2.8	2.9	3.1	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2
NON TRANSIT REVENUES	16.0	16.0	17.0	17.0	18.0	18.0	18.0	19.0	19.0	19.0	20.0	20.0	20.0	21.0	21.0	21.0
TOTAL REVENUES	131.0	214.7	269.4	321.5	348.9	373.8	437.9	478.6	514.4	554.3	600.2	648.5	700.2	756.8	852.4	919.8
OPERATING BALANCE	-324.4	-276.5	-263.9	-257.2	-277.7	-298.9	-230.0	-218.8	-235.5	-240.2	-252.9	-267.3	-282.5	-297.5	-255.4	-267.5
FARE BOX RATIO	0.29	0.44	0.51	0.56	0.56	0.56	0.66	0.69	0.69	0.70	0.70	0.71	0.71	0.72	0.77	0.77

III. OPERATING GRANTS

LOCAL OPERATOR CONTRIBUTION																	
STA REMAINING ALLOC	10.1	9.2	4.5	1.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TDA 85%	102.9	111.5	121.3	131.4	141.4	151.9	163.4	175.4	188.4	201.5	215.8	230.8	248.1	266.9	287.0	308.5
---)RTD SECTION 9 OPER	47.4	47.3	47.3	14.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PROP A 40% DISCR	184.8	106.8	114.2	124.0	135.4	145.5	156.7	168.0	180.5	193.0	206.5	221.1	237.7	255.4	274.9	295.6
TOTAL OPERATING GRANTS	345.2	274.9	289.3	274.2	277.2	297.4	320.4	343.4	368.9	394.5	422.1	451.8	485.8	522.3	561.9	604.3
OPER $ REMAINING FOR CAP GRANTS	20.8	-1.4	25.4	18.9	-8.5	-1.5	90.3	124.4	133.4	154.4	169.2	184.6	203.3	225.0	306.4	336.7

B. CAPITAL COSTS AND FUNDING

IV. CAPITAL COSTS

METRO RAIL CP	104.2	534.7	358.3	220.1	287.0	244.5	202.7	108.4	57.4	144.7	284.0	281.1	396.1	446.0	349.2	245.7
LIGHT RAIL CP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BUS ACQUISITION/REPLACEMENT	3.0	32.4	35.2	58.4	8.0	48.6	15.8	55.4	88.9	95.2	112.5	72.7	110.7	104.9	113.5	120.1
BUILDINGS/OFFICE EQUIPMENT/LAND	42.8	32.4	32.8	41.9	30.3	34.9	37.5	40.3	43.3	46.7	50.1	53.9	58.0	62.3	67.0	72.0
TOTAL CAPITAL COSTS	150.1	599.9	426.3	312.6	318.1	348.0	255.9	204.2	189.6	288.5	444.4	407.7	564.8	613.2	530.5	457.8

V. CAPITAL GRANTS

OPER $ REMAINING FOR CAP GRANTS	20.8	0.0	25.4	18.9	0.0	0.0	90.3	124.4	133.4	154.4	169.2	184.6	203.3	225.0	306.4	336.7
---)RTD PROP A RAIL PROGRAM SET ASIDE	38	56	55	56	70	70	42.8	21	0	0	0	0	0	0	0	0	0
STA METRORAIL SET ASIDE		6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TDA 15%		18.2	19.7	21.4	23.2	25.0	26.8	28.9	31.0	33.2	35.6	38.0	40.7	43.8	47.1	50.6	54.5
BENEFIT ASSESSMENT		40.0	25.0	25.0	20.3	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30% CITY OF L.A. PROPA		8.8	9.4	10.4	11.3	12.1	13.0	14.0	15.0	16.2	17.3	18.5	19.8	21.3	22.9	24.6	26.5
GUIDEWAY FUND		63.2	72.0	54.3	57.5	57.0	20.7	20.5	20.4	26.3	20.2	20.2	20.1	20.1	20.0	19.9	19.8
---)RTD SECTION 9 CAPITAL		48.0	58.0	24.2	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---)RTD SECTION 3 DISCR	117.2	132.8	132.8	138.1	137.3	137.8	126.5	134.1	135.9	135.6	135.4	135.3	135.5	135.6	135.5	135.4	135.2
TOTAL CAPITAL GRANTS	155.2	421.7	372.1	354.9	358.5	341.1	239.4	310.8	327.0	338.7	342.8	381.3	400.7	424.8	458.5	537.1	572.7
BALANCE	155.2	271.7	-227.8	-69.5	45.9	23.0	-108.4	55.5	122.8	149.1	74.3	-65.4	-7.0	-140.8	-182.7	6.4	114.9
CUMULATIVE BALANCE	155.2	426.9	199.1	129.6	175.5	198.5	90.0	145.4	268.4	417.5	491.8	426.4	419.4	278.5	95.8	102.4	217.3

Other assumptions that have been made in the current version of LODESTAR are listed in the text under "ASSUMPTION." The text for these "ASSUMPTIONS" should be changed by the user when one of the revenue inputs is changed. The printout thus will contain a current list of key revenue assumptions.

4.5 SUMMARY

A few of the possible management uses of LODESTAR have been highlighted in this document. It is expected that, as the user gains familiarity with the system additional uses will be found, enhancing the value of LODESTAR as a planning and management tool.

MODULE1: MANAGEMENT POLICY

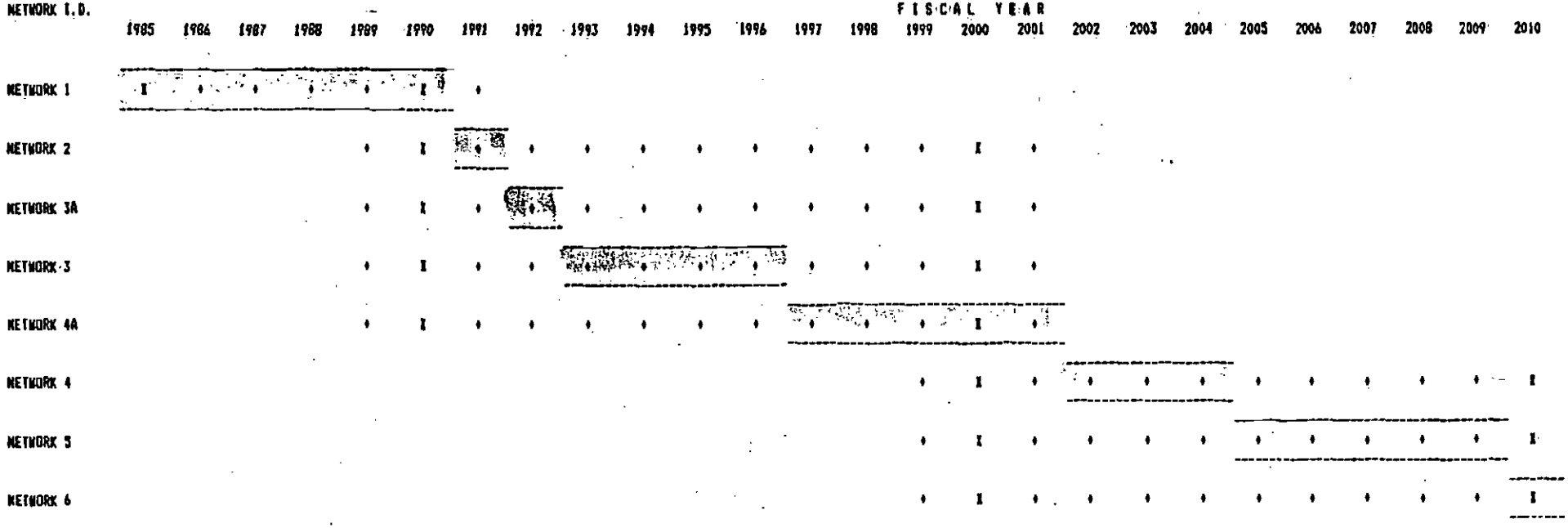
THE FOLLOWING TRANSPORTATION IMPROVEMENTS HAVE BEEN IDENTIFIED FOR INCLUSION IN THE LONG RANGE PLAN

HEAVY RAIL DESC	EST COST	DURR	LIGHT RAIL DESC	EST COST	DURR	BUSWAY DESC	EST COST	DURR
MOS-1	871	6	LB-LA	427.2	5	HARBOR	200	3
MOS-2	336.5	5	CENTURY	133	4			
MOS-3	336.5	5	SF VALLEY	311	3			
MOS-4	462.35	5	COASTAL	170	3			
MOS-5	462.35	5	HUNTINGTON	300	3			
EAST LA METRO	0	5	PASADENA *	296	4			
NORWALK METRO *	0	5	TORRANCE *	160	3			
SANTA MONICA *	0	6						

LODESTAR 091285

THE FOLLOWING IMPROVEMENTS HAVE BEEN INCORPORATED INTO THE IDENTIFIED NETWORKS

SCHEDULED IMPLEMENTATION	NETWORK DESIGNATION/DESCRIPTION	SIMULATION DATES		OPERATING COSTS						REVENUE PROJECTIONS					
				BUS		METRO		LRT		BUS		METRO		LRT	
		SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2
1984 FISCAL YEAR	NW1 = ALL BUS SYSTEM	1985	1990	434.37	483.50	0.00	0.00	0.00	0.00	224.85	252.71	0.00	0.00	0.00	0.00
1991 FISCAL YEAR	NW2 = MOS1 LB-LA	1990	2000	415.40	506.38	16.00	16.00	13.20	13.20	253.75	304.01	8.65	10.59	14.28	17.45
1992 FISCAL YEAR	NW3A= NW2 MOS2	1990	2000	394.44	480.84	24.53	24.53	13.20	13.20	250.65	300.30	11.16	22.35	18.42	22.51
1993 FISCAL YEAR	NW3 = NW3A MOS3 CENT	1990	2000	373.48	455.29	33.05	33.05	20.80	20.80	236.75	296.58	13.67	34.11	22.56	27.57
1997 FISCAL YEAR	NW4A= NW3 MOS4	1990	2000	357.81	436.18	41.65	41.65	20.80	20.80	236.67	296.48	16.87	42.09	29.69	36.29
2002 FISCAL YEAR	NW4 = NW3 MOS5 SF VALLEY	2000	2010	342.13	417.06	50.25	50.25	29.00	29.00	236.59	296.38	20.06	50.06	36.82	45.00
2005 FISCAL YEAR	NW5 = NW4 HARBOR COSTAL	2000	2010												
2010 FISCAL YEAR	NW6 = NW5 EAST LA HUNTINGTON	2000	2010												



MODULE 2 ECONOMIC/DEMOGRAPHIC PROJECTIONS

	FISCAL YEAR		1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	INPUT																		
	POPULATION																		
--->SCAG	L.A. CO. POPULATION, CY	000s	7867	7911	7955	7998	8040	8081	8121	8161	8200	8237	8276	8311	8346	8381	8415	8449	8481
--->SCAG	L.A. CO. POPULATION, FY	000s	7752	7889	7933	7976.5	8019	8060.5	8101	8141	8180.5	8218.5	8256.5	8293.5	8328.5	8363.5	8398	8432	8465
--->SCAG	L.A. CO. POPULATION GROWTH RATE	%		1.77	0.56	0.55	0.53	0.52	0.50	0.49	0.49	0.46	0.46	0.45	0.42	0.42	0.41	0.40	0.39
--->DOF	CA. POPULATION, CY	000s	25598	26020	26430	26836	27236	27629	28014	28399	28754	29113	29477	29820	30150	30474	30792	31106	31414
--->DOF	CA. POPULATION, FY	000s	25219	25809	26225	26633	27036	27433	27822	28207	28577	28934	29295	29649	29985	30312	30633	30949	31260
--->DOF	CA. POPULATION GROWTH RATE	%		2.34	1.61	1.56	1.51	1.47	1.42	1.38	1.31	1.25	1.25	1.21	1.13	1.09	1.06	1.03	1.00
--->USDOC	U.S. POPULATION, CY	000s	235404	237554	239679	241771	243835	245863	247862	249830	251766	253669	255540	257379	259186	260960	262701	264410	266087
--->USDOC	U.S. POPULATION, FY	000s	234313	236480	238618	240725	242803	244849	246863	248846	250798	252718	254605	256460	258283	260073	261831	263556	265249
--->USDOC	U.S. POPULATION GROWTH RATE	%		0.92	0.90	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.75	0.73	0.71	0.69	0.68	0.66	0.64
--->DOF	OTHER PROP 5 CO. POPULATION, FY	000s	10211	10449	10618	10783	10946	11107	11264	11420	11570	11714	11861	12004	12140	12273	12402	12530	12656
--->DOF	OTHER PROP 5 CO. POP GRWTH RATE	%		2.34	1.61	1.56	1.51	1.47	1.42	1.38	1.31	1.25	1.25	1.21	1.13	1.09	1.06	1.03	1.00
	PRICE INDICES																		
--->CAL	U.S. CPI-U	1984=100	100.00	104.84	110.56	117.45	124.77	132.28	139.14	147.21	155.16	163.69	172.70	182.20	192.22	202.79	213.94	225.71	238.12
--->CAL	U.S. CPI-U GROWTH RATE	%		4.9	5.4	6.2	6.2	6.0	5.2	5.8	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
--->CAL	U.S. CPI-U	1967=100	304.80	319.60	337.00	358.00	380.30	403.20	424.10	448.70	472.93	498.94	526.38	555.33	585.88	618.10	652.10	687.96	725.80
--->CAL	CA. HWY CONSYRUCTION INDEX	1984=100	100.00	106.00	112.36	120.23	128.64	137.65	147.28	158.77	170.52	183.31	197.05	211.83	227.72	244.80	263.16	282.90	304.11
--->CAL	CA. HCI GROWTH RATE	%		6.0	6.0	7.0	7.0	7.0	7.0	7.8	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
	REAL PERSONAL INCOME/CAPITA																		
--->SCAG	L.A. REAL PERSNL INCOME/CAPITA	$,1967	4769	4845	4935	5010	5052	5133	5201	5264	5333	5382	5433	5489	5570	5655	5741	5829	5918
--->SCAG	L.A. REAL PERSNL INCM/CAP GRWTH	%		1.60	1.85	1.52	0.84	1.61	1.31	1.22	1.32	0.92	0.95	1.03	1.48	1.52	1.53	1.53	1.53
--->CAL	CA. REAL PERSNL INCOME/CAPITA	$,1967	4554	4628	4720	4795	4835	4921	4988	5052	5123	5171	5223	5280	5365	5451	5539	5628	5719
--->CAL	CA. REAL PERSNL INCM/CAP GRWTH	%		1.62	1.99	1.59	0.83	1.78	1.36	1.28	1.41	0.94	1.01	1.09	1.61	1.61	1.61	1.61	1.61
--->CAL	CA. PERSNL INCOME/CAP GRWNTH	%		6.56	7.54	7.92	7.12	7.91	6.62	7.16	6.88	6.49	6.56	6.65	7.20	7.20	7.20	7.20	7.20
	TAXABLE SALES COEFFICIENTS																		
--->SCAG	L.A. TXBL SALES/PERSNL INCM			0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259	0.5259
--->RTD	L.A. TS/PI 1SAFE ESTIMATE)			0.4994	0.4994	0.5127	0.5127	0.5127	0.5127	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200
--->SCAB	CA. TXBL SALES/PERSNL INCM			0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435	0.5435
	GASOLINE PRICES																		
--->CAL	CA. GASOLINE REAL PRICE	$/GAL,FY84	1.14	1.09	1.04	1.06	1.06	1.08	1.10	1.12	1.14	1.16	1.17	1.19	1.23	1.27	1.31	1.35	1.39
--->CAL	CA. GASOLINE PRICE	$/BAL,I	1.14	1.14	1.15	1.25	1.33	1.43	1.54	1.66	1.77	1.89	2.03	2.17	2.34	2.57	2.79	3.04	3.31
--->CAL	CA. GAS REAL PRICE GRWTH RATE	%		-4.28	-4.47	1.75	0.29	1.72	1.97	1.93	1.36	1.34	1.58	1.56	3.10	3.10	3.10	3.10	3.10
	VEHICLE MILES TRAVELED																		
--->CAL	CA. LDV VMT/Capita Index	FY84=100	100	101.14	102.54	103.69	104.29	105.59	106.60	107.55	108.61	109.32	110.09	110.93	112.18	113.45	114.73	116.02	117.33
--->CAL	CA. LDV VMT/CAPITA GRWTH RATE	%		1.14	1.39	1.11	0.58	1.25	0.95	0.90	0.98	0.66	0.70	0.76	1.13	1.13	1.13	1.13	1.13
--->CAL	CA. Commercial Fleet Index	FY84=100	104	107.7	111.5	115.6	119.7	121.46	123.18	124.88	126.52	128.10	129.70	131.27	132.76	134.20	135.63	137.02	138.40
--->SCAG	CA. COM'L FLT INDEX GRWTH RATE	%		3.56	3.53	3.68	3.55	1.47	1.42	1.38	1.31	1.25	1.25	1.21	1.13	1.09	1.06	1.03	1.00
	FUEL DEMAND																		
--->CAL	CA. NEW LDV FUEL EFFICIENCY	MPG	23.70	22.89	22.07	22.38	22.43	22.74	23.10	23.46	23.71	23.96	24.27	24.57	25.18	25.80	26.44	27.10	27.77
--->CAL	CA. NEW LDV FUEL EFFCY GR RATE	%		-3.42	-3.58	1.40	0.23	1.38	1.58	1.55	1.08	1.07	1.27	1.25	2.48	2.48	2.48	2.48	2.48
--->CEC	CA. AVG LDV FUEL EFFICIENCY	MPG	16.40	17.31	17.98	18.59	19.13	19.63	20.12	20.59	21.02	21.44	21.83	22.22	22.63	23.07	23.55	24.04	24.57
--->CEC	CA. AVG LDV FUEL EFFCY GR RATE	%		5.54	3.85	3.43	2.89	2.64	2.47	2.32	2.12	1.96	1.85	1.76	1.87	1.96	2.04	2.11	2.17
--->CAL	CA. LDV FUEL DEMAND	MIL GALS	10559	10455	10372	10297	10218	10227	10219	10216	10234	10230	10241	10264	10305	10332	10347	10353	10350
--->CAL	CA. TRUCK FUEL DEMAND	MIL GALS	1773	1836	1901	1971	2041	2071	2100	2129	2157	2184	2211	2238	2263	2288	2312	2336	2359
--->CAL	FUEL TYPE ADJUSTMENT FACTOR	MIL GALS	422	418	415	412	409	409	409	409	409	409	410	411	412	413	414	414	414
	U.S. GASOLINE ADJUSTMENT FACTOR			0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	U.S. DIESEL ADJUSTMENT FACTOR			1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	FARE BOX REVENUES																		
--->SCAG	L.A. CO FAREBOX REVENUES	$MIL,I		116.8	178.5	226.6	280.1	338.8	345.5	372.7	400.6	430.8	463.2	495.9	534.6	574.1	616.4	661.6	709.8
--->SCAG	L.A. CO REAL FAREBOX REVENUES	$MIL,1984		111.4	161.4	192.9	224.5	256.1	248.3	253.2	258.2	263.2	268.2	272.2	278.1	283.1	288.1	293.1	298.1
--->SCAG	CA. FAREBOX REVENUES	$MIL,I	642.7	689.7	738.9	797.2	859.7	924.8	986.5	1058.2	1130.0	1207.0	1289.3	1376.6	1468.8	1566.5	1670.2	1780.2	1897.0
--->SCAG	CA. REAL FAREBOX REVENUES	%		7.31	7.14	7.88	7.84	7.58	6.68	7.26	6.78	6.82	6.82	6.77	6.70	6.65	6.62	6.59	6.56
	OUTPUT																		
	L.A. CO TXBL TRANS (SAFE EST)	$BIL,I		60	65	72	78	84	90	99	106	113	121	130	139	149	161	173	186
	CA. TAXABLE TRANSACTIONS	$BIL,I		202	221	243	266	289	313	341	369	399	431	465	501	543	589	638	691
	SCRTD/L.A.CO SUBSIDY SHARE			0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.96	0.86	0.86	0.86	0.86
	CA. GASOLINE SALES	MIL GALS	10981	10873	10787	10709	10627	10636	10627	10625	10644	10639	10651	10674	10717	10745	10761	10767	10764
	CA. DIESEL SALES	MIL GALS		1418	1486	1559	1632	1661	1691	1720	1748	1775	1802	1827	1851	1875	1898	1922	1945
	U.S. GASOLINE SALES	MIL GALS		98632	97165	95826	94486	93985	93355	92796	92479	91997	91642	91410	91390	91269	91060	90715	90425
	U.S. DIESEL SALES	MIL GALS		16089	17577	18317	19053	19279	19508	19731	19938	20151	20354	20548	20728	20910	21093	21276	21460
	CA. GASOLINE PRICE	$,I		1.14	1.15	1.25	1.33	1.43	1.54	1.66	1.77	1.89	2.03	2.17	2.34	2.57	2.79	3.04	3.31
	PROP 5 CO POP/CA POP COEFF			0.7105	0.7074	0.7044	0.7015	0.6987	0.6961	0.6935	0.6911	0.6889	0.6867	0.6846	0.6826	0.6808	0.6790	0.6773	0.6757
	SCRTD OPR REV/CA OPR REV COEFF			0.1694	0.2415	0.2842	0.3258	0.3663	0.3502	0.3522	0.3545	0.3569	0.3592	0.3603	0.3639	0.3665	0.3690	0.3716	0.3742
	L.A.CO POP/CA.POP COEFF			0.3057	0.3025	0.2995	0.2966	0.2938	0.2912	0.2886	0.2863	0.2840	0.2818	0.2797	0.2778	0.2759	0.2741	0.2724	0.2708
	LA CO POP/OTHR PROPS CO POP COEF			0.4302	0.4276	0.4252	0.4228	0.4205	0.4183	0.4162	0.4142	0.4123	0.4104	0.4086	0.4069	0.4053	0.4037	0.4022	0.4008
	TP&D SALES TAI CAP GROWTH RATE	%		7.31	7.14	7.88	7.84	7.58	6.68	7.26	6.78	6.82	6.82	6.77	6.70	6.65	6.62	6.59	6.56

MODULE 3 FARE BOX REVENUE PROJECTIONS

				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
INPUT FROM MODULE 2																				
--->CAL	U.S. CPI-U	1984=100	100.00	104.86	110.56	117.45	124.77	132.28	139.14	147.21	155.16	163.69	172.70	182.20	192.22	202.79	213.94	225.71	238.12
--->CAL	U.S. CPI-U GROWTH RATE	I			4.86	5.44	6.23	6.23	6.02	5.18	5.80	5.40	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
INPUT FROM UTPS REVENUE MODEL				SIMULATION DATES				I BUS		I METRORAIL		I LIGHTRAIL		I						
				SIM-1	SIM-2			SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2							
1984 NW1 = ALL BUS SYSTEM		1984 $MIL		1985	1990			224.85	252.71	0.00	0.00	0.00	0.00							
1991 NW2 = MOS1 LB-LA		1984 $MIL		1990	2000			253.75	304.01	8.65	10.59	14.28	17.45							
1992 NW3A= NW2 MOS2		1984 $MIL		1990	2000			250.65	300.30	11.16	22.35	18.42	22.51							
1993 NW3 = NW3A MOS3 CENT		1984 $MIL		1990	2000			236.75	296.58	13.67	34.11	22.56	27.57							
1997 NW4A= NW3 MOS4		1984 $MIL		1990	2000			236.67	296.48	16.87	42.09	29.69	36.29							
2002 NW4 = NW3 MOS5 SF VALLEY		1984 $MIL		2000	2010			236.59	296.38	20.06	50.06	36.82	45.00							
2005 NW5 = NW4 HARBOR COSTAL		1984 $MIL		2000	2010															
2010 NW6 = NW5 EAST LA HUNTINGTON		1984 $MIL		2000	2010															
1984 NETWORK (BUS)		1984 $MIL	219.28	224.85	230.42	235.99	241.57	247.14	252.71	258.28										
1991 NETWORK (BUS)		1984 $MIL						248.72	253.75	258.77	263.80	268.83	273.85	278.88	283.90	288.93	293.96	298.98	304.01	
1992 NETWORK (BUS)		1984 $MIL						245.68	250.65	255.61	260.58	265.54	270.51	275.47	280.44	285.40	290.37	295.33	300.29	
1993 NETWORK (BUS)		1984 $MIL						230.76	236.75	242.73	248.71	254.70	260.68	266.66	272.65	278.63	284.61	290.60	296.58	
1997 NETWORK (BUS)		1984 $MIL						230.69	236.67	242.65	248.63	254.61	260.59	266.57	272.55	278.54	284.52	290.50	296.48	
2002 NETWORK (BUS)		1984 $MIL																230.61	236.59	
2005 NETWORK (BUS)		1984 $MIL																0.00	0.00	
2010 NETWORK (BUS)		1984 $MIL																0.00	0.00	
FARE BOX REVENUES (BUS)		1984 $MIL		224.85	230.42	235.99	241.57	247.14	252.71	258.77	260.58	254.70	260.68	266.66	272.65	278.54	284.52	290.50	296.48	
1984 NETWORK (HEAVY RAIL)		1984 $MIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
1991 NETWORK (HEAVY RAIL)		1984 $MIL						8.46	8.65	8.84	9.04	9.23	9.43	9.62	9.81	10.01	10.20	10.40	10.59	
1992 NETWORK (HEAVY RAIL)		1984 $MIL						10.04	11.16	12.28	13.40	14.52	15.64	16.76	17.87	18.99	20.11	21.23	22.35	
1993 NETWORK (HEAVY RAIL)		1984 $MIL						11.63	13.67	15.71	17.76	19.80	21.85	23.89	25.93	27.98	30.02	32.07	34.11	
1997 NETWORK (HEAVY RAIL)		1984 $MIL						14.34	16.87	19.39	21.91	24.43	26.95	29.48	32.00	34.52	37.04	39.56	42.09	
2002 NETWORK (HEAVY RAIL)		1984 $MIL																17.06	20.06	
2005 NETWORK (HEAVY RAIL)		1984 $MIL																0.00	0.00	
2010 NETWORK (HEAVY RAIL)		1984 $MIL																0.00	0.00	
FARE BOX REVENUES (HEAVY RAIL)		1984 $MIL		0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.84	13.40	19.80	21.85	23.89	25.93	34.52	37.04	39.56	42.09
1984 NETWORK (LIGHT RAIL)		1984 $MIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
1991 NETWORK (LIGHT RAIL)		1984 $MIL						13.96	14.28	14.60	14.91	15.23	15.55	15.87	16.18	16.50	16.82	17.13	17.45	
1992 NETWORK (LIGHT RAIL)		1984 $MIL						18.01	18.42	18.83	19.24	19.65	20.06	20.47	20.87	21.28	21.69	22.10	22.51	
1993 NETWORK (LIGHT RAIL)		1984 $MIL						22.06	22.56	23.06	23.56	24.06	24.56	25.07	25.57	26.07	26.57	27.07	27.57	
1997 NETWORK (LIGHT RAIL)		1984 $MIL						29.03	29.69	30.35	31.01	31.67	32.33	32.99	33.65	34.31	34.97	35.63	36.29	
2002 NETWORK (LIGHT RAIL)		1984 $MIL																36.00	36.82	
2005 NETWORK (LIGHT RAIL)		1984 $MIL																0.00	0.00	
2010 NETWORK (LIGHT RAIL)		1984 $MIL																0.00	0.00	
FARE BOX REVENUES (LIGHT RAIL)		1984 $MIL		0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.60	19.24	24.06	24.56	25.07	25.57	34.31	34.97	35.63	36.29
FARE BOX REVENUES																				
FARE BOX REVENUES (BUS)		I $MIL		112.43	195.86	249.47	301.40	326.92	351.62	380.94	404.31	416.92	450.19	485.85	524.07	564.84	608.70	655.68	705.99	
FARE BOX REVENUES (HEAVY RAIL)		I $MIL		0.00	0.00	0.00	0.00	0.00	0.00	13.02	20.79	32.41	37.73	43.53	49.85	70.00	79.25	89.30	100.21	
FARE BOX REVENUES (LIGHT RAIL)		I $MIL		0.00	0.00	0.00	0.00	0.00	0.00	21.49	29.85	39.39	42.42	45.67	49.14	69.57	74.81	80.41	86.40	
FARE BOX REVENUES (ALL MODES)		I $MIL		112.43	195.86	249.47	301.40	326.92	351.62	415.45	454.95	488.73	530.34	575.04	623.06	704.41	762.76	825.39	892.60	

MODULE 3 CONVENTIONAL FUNDING PROJECTIONS

FISCAL YEAR		1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
INPUT FROM MODULES 2 & 3																		
--->MOD 2 L.A. CO TIBL TRANS (SAFE EST)	$BIL,I		60	65	72	78	84	90	99	106	113	121	130	139	149	161	173	186
--->MOD 2 CA. TAXABLE TRANSACTIONS	$BIL,I		202	221	243	266	289	313	341	369	399	431	465	501	543	589	638	691
--->MOD 2 SCRTD/L.A.CO SUBSIDY SHARE			0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
--->MOD 2 CA. GASOLINE SALES	MIL GALS	10981	10873	10787	10709	10627	10636	10627	10625	10644	10639	10651	10674	10717	10745	10761	10767	10764
--->MOD 2 CA. DIESEL SALES	MIL GALS		1418	1486	1559	1632	1661	1691	1720	1748	1775	1802	1827	1851	1875	1898	1922	1945
--->MOD 2 U.S. GASOLINE SALES	MIL GALS		98632	97165	95826	94486	93985	93355	92796	92479	91997	91642	91410	91390	91269	91060	90775	90425
--->MOD 2 U.S. DIESEL SALES	MIL GALS		16889	17577	18317	19053	19279	19508	19731	19938	20151	20354	20548	20728	20910	21093	21276	21460
--->MOD 2 CA. GASOLINE PRICE	$,I		1.14	1.15	1.25	1.33	1.43	1.54	1.66	1.77	1.89	2.03	2.17	2.36	2.57	2.79	3.04	3.31
--->MOD 2 PROP 5 CO POP/CA POP COEFF			0.7105	0.7074	0.7044	0.7015	0.6987	0.6961	0.6935	0.6911	0.6889	0.6867	0.6846	0.6826	0.6808	0.6790	0.6773	0.6757
--->MOD 2 SCRTD OPR REV/CA OPR REV COEFF			0.1694	0.2415	0.2842	0.3258	0.3663	0.3502	0.3522	0.3545	0.3569	0.3592	0.3603	0.3639	0.3665	0.3690	0.3716	0.3742
--->MOD 2 L.A.CO POP/CA.POP COEFF			0.3057	0.3025	0.2995	0.2966	0.2938	0.2912	0.2886	0.2863	0.2840	0.2818	0.2797	0.2778	0.2759	0.2741	0.2724	0.2708
--->MOD 2 LA CO POP/OTHR PROPS CO POP COEF			0.4302	0.4276	0.4252	0.4228	0.4203	0.4183	0.4162	0.4142	0.4123	0.4104	0.4086	0.4069	0.4053	0.4037	0.4022	0.4008
--->MOD 2 TP&D SALES TAX CAP GROWTH RATE	I		7.31	7.14	7.88	7.84	7.58	6.68	7.26	6.78	6.82	6.82	6.77	6.70	6.65	6.62	6.59	6.56
FARE BOX REVENUES (ALL MODES)	I $MIL		112.4	195.9	249.5	301.4	326.9	351.6	415.5	455.0	488.7	530.3	575.0	623.1	704.4	762.8	825.4	892.6
CA. GASOLINE SALES TAX	$MIL,I		625	622	644	686	733	789	848	910	974	1043	1119	1212	1323	1442	1570	1708
CA. TDA FUNDS	$MIL,I		505	551	607	665	721	783	852	922	999	1077	1162	1253	1358	1472	1594	1726
FUEL TAX SPILLOVER	$MIL,I		121	70	38	21	12	5	0	0	0	0	0	0	0	0	0	0
TP&D SALES TAX CAP	$MIL,I	162	174	186	201	217	233	249	267	285	304	325	347	370	395	421	449	478
TP&D SALES TAX REVENUE	$MIL,I		121	70	38	21	12	5	0	0	0	0	0	0	0	0	0	0
CA. GENERAL FUND SPILLOVER	$MIL,I		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UNIFIED TRANSP FUND	$MIL,I		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UTF TO TP&D	$MIL,I		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UTF TO STATE HWY ACCT	$MIL,I		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TP&D INCOME	$MIL,I		121	70	38	21	12	5	0	0	0	0	0	0	0	0	0	0
TP&D TO CA TRANSP BUDGET	$MIL,I		48	28	15	9	5	2	0	0	0	0	0	0	0	0	0	0
TP&D TO GUIDEWAY FUND	$MIL,I		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHA FUEL TAXES	$MIL,I		567	566	566	565	567	568	569	571	572	574	576	579	582	584	585	586
ARTICLE 19 FUNDS PROP 5 CNTY	$MIL,I		403	400	398	396	396	395	395	395	394	394	395	396	396	396	396	396
PROP A FUNDS ($I,M)	$MIL,I		282.8	306.4	342.2	371.0	398.8	428.4	468.0	501.8	538.9	576.4	616.7	660.1	709.7	763.3	821.0	882.8
25% LOCAL RETURN	$MIL,I		70.7	76.6	85.6	92.8	99.7	107.1	117.0	125.4	134.7	144.1	154.2	165.0	177.4	190.8	205.2	220.7
40% LACTC DISCRET	$MIL,I		212.1	116.4	130.0	141.0	151.5	162.8	177.9	190.7	204.8	219.0	234.3	250.9	269.7	290.1	312.0	335.5
35% RAIL PROGRAM	$MIL,I		0.0	107.2	119.8	129.9	139.6	149.9	163.8	175.6	188.6	201.7	215.8	231.0	248.4	267.2	287.3	309.0
TDA ARTICLE 4 FUNDS:LA CNTY	$MIL,I		138.9	150.6	168.1	182.3	195.9	210.5	230.0	246.5	264.8	283.2	303.0	324.3	348.7	375.0	403.3	433.8
95% BY REGIONAL FORMULA	$MIL,I		132.0	143.0	159.7	173.2	186.1	199.9	218.5	234.2	251.5	269.0	287.8	308.1	331.3	356.3	383.2	412.1
5% LACTC DISCRET FUND	$MIL,I		6.9	7.5	8.4	9.1	9.8	10.5	11.5	12.3	13.2	14.2	15.1	16.2	17.4	18.8	20.2	21.7
STA FUNDS	$MIL,I		72.3	42.3	22.6	12.8	7.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70% ALLOCATION BY POP	$MIL,I		14.5	8.4	4.5	2.5	1.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30% ALLOC BY REVENUES	$MIL,I		4.3	3.6	2.2	1.5	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LACTC RAIL SET ASIDE	$MIL,I		6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REMAINING STA ALLOC	$MIL,I		12.8	12.0	6.7	4.0	2.4	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GUIDEWAY FUND	$MIL,I		100.7	100.1	99.6	99.1	99.0	98.8	98.7	98.7	98.6	98.6	98.6	98.9	99.0	99.1	99.1	99.0
50% ALLOC BY POP TO LACTC DISC	$MIL,I		21.6	21.4	21.2	21.0	20.8	20.7	20.5	20.4	20.3	20.2	20.2	20.1	20.1	20.0	19.9	19.8
50% ALLOC TO CTC DISCRET FUND	$MIL,I		50.3	50.0	49.8	49.6	49.5	49.4	49.3	49.4	49.3	49.3	49.4	49.4	49.5	49.5	49.5	49.5
SECTION 9&18 FORMULA GRANT	$MIL,I		2450.0	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5	2082.5
SECTION 9 (OPERATING CAP)	$MIL,I		55.1	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
SECTION 9:LA CNTY SHARE	$MIL,I		119.2	101.4	101.4	101.4	101.4	101.4	101.4	101.4	101.4	101.4	101.4	101.4	101.4	101.4	101.4	101.4
METRORAIL SET ASIDE	$MIL,I		20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SECT 9 (OPERATIONS)	$MIL,I		55.1	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
SECT 9 (CAPITAL)	$MIL,I		44.1	26.4	26.4	26.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4
SECT 3 FUNDS (1 CENT FUEL TAX)	$MIL,I		1120.0	1120.0	1141.4	1135.4	1132.6	1128.6	1125.3	1124.2	1121.5	1120.0	1119.6	1121.2	1121.8	1121.5	1120.5	1118.9
OUTPUT																		
RTD OPERATING SUBSIDIES																		
<--- 10 PROPA 40% DISC	$MIL,I		173.3	95.1	106.2	115.2	123.8	133.0	145.3	155.8	167.3	179.0	191.5	204.9	220.3	237.0	254.9	274.1
<--- 10 TDA 95% REGNL FORMULA (85%)	$MIL,I		96.5	104.6	116.8	126.6	136.1	146.2	159.7	171.2	183.9	196.7	210.4	225.2	242.2	260.4	280.1	301.2
<--- 10 STA REMAINING ALLOCATION	$MIL,I		11.0	10.3	5.8	3.4	2.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<--- 10 SECTION 9:OPERATING	$MIL,I		47.4	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3
<--- 10 FARE BOX REVENUES	$MIL,I		112.4	195.9	249.5	301.4	326.9	351.6	415.5	455.0	488.7	530.3	575.0	623.1	704.4	762.8	825.4	892.6
<--- 10 AUX REV/LOCAL OPR CONTRIBUTIONS	$MIL,I		2.6	2.8	2.9	3.1	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2
<--- 10 NON TRANSIT REVENUES	$MIL,I		16.0	16.0	17.0	17.0	18.0	18.0	18.0	19.0	19.0	19.0	20.0	20.0	20.0	21.0	21.0	21.0
CAPITAL FUNDING (CONV.FUNDS)																		
<--- 10 TDA 95% REGIONAL FORMULA (15%)	$MIL,I		17.0	18.5	20.6	22.3	24.0	25.8	28.2	30.2	32.4	34.7	37.1	39.7	42.7	46.0	49.4	53.2
<--- 10 STA METRORAIL SET ASIDE	$MIL,I		6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<--- 10 SECT 9 METRORAIL SET ASIDE	$MIL,I		20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<--- 10 SECT 9:REMAINING FOR CAPITAL	$MIL,I		38.0	22.7	22.7	22.7	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9
<--- 10 BENEFIT ASSESSMENT DISTRICT	$MIL,I		60.0	25.0	25.0	20.3	20.0	20.0	0.0	10.0	0.0	10.0	0.0	0.0	0.0	0.0	10.0	0.0
<--- 10 PROPA 35% (DEVERTED FOR BONDS)	$MIL,I		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<--- 10 PROPA 25% LOCAL RETURN TO L.A.	$MIL,I		27.6	29.9	33.4	36.2	38.9	41.8	45.6	48.9	52.5	56.2	60.1	64.4	69.2	74.4	80.0	86.1
<--- 10 GDWY 50% POP FORMULA LACTC DISCR	$MIL,I		21.6	21.4	21.2	21.0	20.8	20.7	20.5	20.4	20.3	20.2	20.2	20.1	20.1	20.0	19.9	19.8
<--- 10 GDWY 50% CTC DISCR	$MIL,I		50.3	50.0	49.8	49.6	49.5	49.4	49.3	49.4	49.3	49.3	49.4	49.4	49.5	49.5	49.5	49.5
<--- 10 SECT 3 TO LA (UZA W/POP)LM ONLY)	$MIL,I		132.8	132.8	135.3	134.6	134.3	133.8	133.4	133.3	133.0	132.8	132.7	132.9	133.0	133.0	132.8	132.6
<--- 10 SECT 3 TO LA (SEC 9&18 FORMULA)	$MIL,I		46.9	46.9	47.8	47.5	47.4	47.2	47.1	47.1	46.9	46.9	46.9	46.9	47.0	46.9	46.9	46.8

MODULE 6 INNOVATIVE FINANCING TECHNIQUES (PROP A BONDING CAPACITY)

(PROP A 40% DESCR FUNDS WILL BE USED FOR COVERAGE AGAINST THE 35% RAIL FUNDS UTILIZED FOR DEBT SETHEREFORE A BETTER THAN 2:1 COVERAGE RATIO WILL BE ACHIEVED)
(33% OF BONDING CAPACITY WILL BE UTILIZED IN FY86, 66% WILL BE UTILIZED IN FY87 AND 100% THEREAFTER)

	INPUT FROM MODULE5																			
	PROP A RAIL SET ASIDE FUND					0.0	107.2	119.8	129.9	139.6	149.9	163.8	175.6	188.6	201.7	215.8	231.0	248.4	267.2	287.3	309.0
	UTIL. COEF. (UTILIZATION OF FUNDS)					0.0	0.3	0.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	$ AVAILABLE FOR DEBT SERVICE					0.0	35.4	80.2	129.9	139.6	149.9	163.8	175.6	188.6	201.7	215.8	231.0	248.4	267.2	287.3	309.0
DIFER PRINC	BOND AMOUNT	FISCAL YEAR	DURATION (N)	INVEST RATE(I)	DIVIDEND RATE(D)	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000
1	0.0	1985	30	6.0	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	294.9	1986	30	6.0	10		35.4	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
1	389.6	1987	30	6.0	10			46.7	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2
1	434.3	1988	30	6.0	10				52.1	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3
1	404.2	1989	30	6.0	10					12.5	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
1	91.9	1990	30	6.0	10						11.0	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
1	120.6	1991	30	6.0	10							14.5	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7
1	104.8	1992	30	6.0	10								12.6	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
1	113.9	1993	30	6.0	10									13.7	12.9	12.9	12.9	12.9	12.9	12.9	12.9
1	115.5	1994	30	6.0	10										13.9	13.1	13.1	13.1	13.1	13.1	13.1
1	123.6	1995	30	6.0	10											14.8	14.0	14.0	14.0	14.0	14.0
1	133.3	1996	30	6.0	10												16.0	15.1	15.1	15.1	15.1
1	151.8	1997	30	6.0	10													18.2	17.2	17.2	17.2
1	164.4	1998	30	6.0	10														19.7	18.7	18.7
1	176.8	1999	30	6.0	10															21.2	20.1
1	189.9	2000	30	6.0	10																22.8
	REMAINING FUNDS				—	0.0	71.9	39.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CASH FROM PROP A BONDS				10 % DISCOUNT	0.0	265.4	350.6	390.9	93.8	82.7	108.5	94.3	102.5	104.0	111.3	120.0	136.7	148.0	159.1	170.9
<--- 10	PROP A FUNDS AVAIL FOR CAP IMPROVEMENTS					0.0	337.3	390.1	390.9	93.8	82.7	108.5	94.3	102.5	104.0	111.3	120.0	136.7	148.0	159.1	170.9

MODULE 7 OPERATING COST PROJECTIONS

	FISCAL YEAR		1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	INPUT FROM MODULE 2																		
--->CAL	U.S. CPI-U	1984=100	100.00	104.86	110.56	117.45	124.77	132.28	139.14	147.21	155.16	163.69	172.70	182.20	192.22	202.79	213.94	225.71	238.12
--->CAL	U.S. CPI-U GROWTH RATE	%		4.86	5.44	6.23	6.23	6.02	5.18	5.80	5.40	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
	INPUT FROM MODULE 1			SIMULATION DATES				BUS		METRORAIL		LIGHTRAIL							
				SIM-1	SIM-2			SIM-1	SIM-2	SIM-1	SIM-2	SIM-1	SIM-2						
1984	NW1 = ALL BUS SYSTEM	1984 $MIL		1985	1990			434.37	483.50	0.00	0.00	0.00	0.00						
1991	NW2 = MOS1 LB-LA	1984 $MIL		1990	2000			415.40	506.38	16.00	16.00	13.20	13.20						
1992	NW3A= NW2 MOS2	1984 $MIL		1990	2000			394.44	480.84	24.53	24.53	13.20	13.20						
1993	NW3 = NW3A MOS3 CENT	1984 $MIL		1990	2000			373.48	455.29	33.05	33.05	20.80	20.80						
1997	NW4A= NW3 MOS4	1984 $MIL		1990	2000			357.81	436.18	41.65	41.65	20.80	20.80						
2002	NW4 = NW3 MOS5 SF VALLEY	1984 $MIL		2000	2010			342.13	417.06	50.25	50.25	29.00	29.00						
2005	NW5 = NW4 HARBOR COSTAL	1984 $MIL		2000	2010														
2010	NW6 = NW5 EAST LA HUNTINGTON	1984 $MIL		2000	2010														
1984	NETWORK (BUS)	1984 $MIL	424.54	434.37	444.20	454.02	463.85	473.67	483.50	493.33									
1991	NETWORK (BUS)	1984 $MIL						406.30	415.40	424.50	433.60	442.69	451.79	460.89	469.99	479.09	488.18	497.28	506.38
1992	NETWORK (BUS)	1984 $MIL						385.80	394.44	403.08	411.72	420.36	429.00	437.64	446.28	454.92	463.56	472.20	480.84
1993	NETWORK (BUS)	1984 $MIL						365.30	373.48	381.66	389.84	398.02	406.20	414.39	422.57	430.75	438.93	447.11	455.29
1997	NETWORK (BUS)	1984 $MIL						349.97	357.81	365.64	373.48	381.32	389.15	396.99	404.83	412.66	420.50	428.34	436.18
2002	NETWORK (BUS)	1984 $MIL																334.64	342.13
2005	NETWORK (BUS)	1984 $MIL																0.00	0.00
2010	NETWORK (BUS)	1984 $MIL																0.00	0.00
	OPERATING COSTS (BUS)	1984 $MIL		434.37	444.20	454.02	463.85	473.67	483.50	424.50	411.72	398.02	406.20	414.39	422.57	412.66	420.50	428.34	436.18
1984	NETWORK (HEAVY RAIL)	1984 $MIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
1991	NETWORK (HEAVY RAIL)	1984 $MIL						16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
1992	NETWORK (HEAVY RAIL)	1984 $MIL						24.53	24.53	24.53	24.53	24.53	24.53	24.53	24.53	24.53	24.53	24.53	24.53
1993	NETWORK (HEAVY RAIL)	1984 $MIL						33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05
1997	NETWORK (HEAVY RAIL)	1984 $MIL						41.65	41.65	41.65	41.65	41.65	41.65	41.65	41.65	41.65	41.65	41.65	41.65
2002	NETWORK (HEAVY RAIL)	1984 $MIL																50.25	50.25
2005	NETWORK (HEAVY RAIL)	1984 $MIL																0.00	0.00
2010	NETWORK (HEAVY RAIL)	1984 $MIL																0.00	0.00
	OPERATING COSTS (HEAVY RAIL)	1984 $MIL		0.00	0.00	0.00	0.00	0.00	0.00	16.00	24.53	33.05	33.05	33.05	33.05	41.65	41.65	41.65	41.65
1984	NETWORK (LIGHT RAIL)	1984 $MIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
1991	NETWORK (LIGHT RAIL)	1984 $MIL						13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20
1992	NETWORK (LIGHT RAIL)	1984 $MIL						13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20
1993	NETWORK (LIGHT RAIL)	1984 $MIL						20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80
1997	NETWORK (LIGHT RAIL)	1984 $MIL						20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80
2002	NETWORK (LIGHT RAIL)	1984 $MIL																29.00	29.00
2005	NETWORK (LIGHT RAIL)	1984 $MIL																0.00	0.00
2010	NETWORK (LIGHT RAIL)	1984 $MIL																0.00	0.00
	OPERATING COSTS (LIGHT RAIL)	1984 $MIL		0.00	0.00	0.00	0.00	0.00	0.00	13.20	13.20	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80
	OPERATING COSTS																		
<--- 10	OPERATING COSTS (BUS)	1 $MIL		455.46	491.12	533.27	578.74	626.59	672.75	624.91	638.83	651.54	701.50	754.99	812.24	836.84	899.63	964.80	1038.63
<--- 10	OPERATING COSTS (HEAVY RAIL)	1 $MIL		0.00	0.00	0.00	0.00	0.00	0.00	23.55	38.05	54.10	57.08	60.22	63.53	84.46	89.11	94.01	99.18
<--- 10	OPERATING COSTS (LIGHT RAIL)	1 $MIL		0.00	0.00	0.00	0.00	0.00	0.00	19.43	20.48	34.05	35.92	37.90	39.98	42.18	44.50	46.95	49.53
<--- 10	OPERATING COSTS (ALL MODES)	1 $MIL		455.46	491.12	533.27	578.74	626.59	672.75	667.89	697.36	739.69	794.50	853.11	915.75	963.48	1033.24	1107.75	1187.34

CAPITAL COSTS

	CONTRACT DISTIBUTION DATA								
1	2	3	4	5	6	7	8	9	10
100	59.3	35.1	22.9	16.1	12	9.3	7.5	6.2	5.2
	40.7	43.9	36.4	29	23.1	18.9	15.4	12.8	10.9
		21	27.5	26.7	24.2	21.1	18.5	16.1	14
			13.2	18.9	19.7	19.1	17.9	16.4	15
	INPUT FROM MGMT MODULE			9.3	14.2	15.1	15.2	15.1	14.2
1984	NW1 = ALL BUS SYSTEM				6.8	11.1	12.3	12.4	12.5
1991	NW2 = NOS1 LB-LA					5.4	8.9	10	10.4
1992	NW3A= NW2 NOS2						4.3	7.4	8.5
1993	NW3 = NW3A NOS3 CENT							3.6	6.3
1997	NW4A= NW3 NOS4								3
2002	NW4 = NW3 NOS5 SF VALLEY								
2005	NW5 = NW4 HARBOR COSTAL								
2010	NW6 = NW5 EAST LA HUNTINGTON								

--->CAL	CA. HWY CONSTRUCTION INDEX	1984=100	100	106	112.36	120.23	128.64	137.65	147.28	158.77	170.52	183.31	197.05	211.83	227.72	244.80	263.16	282.90	304.11
--->CAL	CA. HCI GROWTH RATE	%		6.00	6.00	7.00	7.00	7.00	7.00	7.80	7.40	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
				1.06	1.12	1.20	1.29	1.38	1.47	1.59	1.71	1.83	1.97	2.12	2.28	2.45	2.63	2.83	3.04

BASE EST $84,M	PROJECT DESCRIPTION	BEGIN OPERATION	PROJECT DURATION	FY85 1985	FY86 1986	FY87 1987	FY88 1988	FY89 1989	FY90 1990	FY91 1991	FY92 1992	FY93 1993	FY94 1994	FY95 1995	FY96 1996	FY97 1997	FY98 1998	FY99 1999	FY00 2000
871	NOS-1 (WILSIRE/AVARADO):TRACS	1991	6	98.3	475.9	243.9	73.5	65.1	18.4	6.6	-	-	-	-	-	-	-	-	-
336.5	NOS-2 (WILSHIRE/CRENSHAW)	1992	5	-	-	54.2	97.6	89.8	63.6	31.3	-	-	-	-	-	-	-	-	-
336.5	NOS-3 (FAIRFAX/BEVERLY:NOS)	1993	5	-	-	-	54.2	97.6	89.8	63.6	31.3	-	-	-	-	-	-	-	-
462.35	NOS-4 (HOLLYWOOD/CAHUENGA)	1997	5	-	-	-	-	-	-	-	74.4	134.1	123.4	87.4	43.0	-	-	-	-
462.35	NOS-5 (REMAINING LPA)	2002	5	-	-	-	-	-	-	-	-	-	-	-	-	74.4	134.1	123.4	87.4
0	EAST LA METRO	2010	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	NORWALK METRO	120	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	SANTA MONICA METRO	120	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
427.2	LB-LA LRT	1991	5	-	68.8	123.9	114.1	80.7	39.7	-	-	-	-	-	-	-	-	-	-
133	CENTURY LRT	1993	4	-	-	-	-	30.5	48.4	36.6	17.6	-	-	-	-	-	-	-	-
311	SF VALLEY LRT	2002	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	109.2	136.5
170	COASTAL LRT	2005	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	HUNTINGTON LRT	2010	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
296	PASADENA LRT	120	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160	TORRANCE LRT	120	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200	HARBOR BUSWAY	2005	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BUS ACQUI AND REPL			2.9	29.0	29.3	39.4	0.0	33.0	9.5	32.5	48.5	48.3	53.1	31.9	45.2	39.9	40.1	39.5
	BUILDINGS			22.9	16.3	16.2	22.5	13.6	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.5	15.3
	OFFICE EQUIP			17.5	12.7	11.1	10.0	8.3	8.4	8.3	8.3	8.3	8.4	8.4	8.3	8.4	8.3	8.4	8.3
	LAND			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CAPITAL COSTS																		
	BUS ACQUI/REPL/BUSWAY CONSTR	I $MIL		3.0	32.6	35.2	50.6	0.0	48.6	15.0	55.4	88.9	95.2	112.5	72.7	110.7	104.9	113.5	120.1
	METRORAIL	I $MIL		104.2	534.7	358.3	289.8	347.6	253.1	161.1	180.3	245.8	243.3	185.1	97.9	182.2	352.8	349.2	265.7
	LIGHT RAIL TRANSIT	I $MIL		0.0	77.3	148.9	146.7	153.1	129.8	58.1	29.9	0.0	0.0	0.0	0.0	0.0	0.0	308.8	415.2
	BUILDINGS/EQUIP/LAND	I $MIL		42.8	32.6	32.8	41.9	30.3	34.9	37.5	40.3	43.3	46.7	50.1	53.9	58.0	62.3	67.8	72.8

MODULE [redacted]ON MANAGER

	FISCAL YEAR		1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	RTD OPERATING SUBSIDIES																		
---> 5	PROPA 40I DISC	$MIL,I		173.3	95.1	106.2	115.2	123.8	133.0	145.3	155.8	167.3	179.0	191.5	204.9	220.3	237.0	254.9	274.1
---> 5	TDA 95I REGNL FORMULA (85II	$MIL,I		96.5	104.6	116.8	126.6	136.1	146.2	159.7	171.2	183.9	196.7	210.4	225.2	242.2	260.4	280.1	301.2
---> 5	STA REMAINING ALLOCATION	$MIL,I		11.0	10.3	5.8	3.4	2.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---> 5	SECTION 9:OPERATING	$MIL,I		47.4	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3
---> 5	FARE BOI REVENUES	$MIL,I		112.4	195.9	249.5	301.4	326.9	351.6	415.5	455.0	490.6	530.3	575.0	623.1	674.6	730.0	825.4	892.6
---> 5	AUX REV/LOCAL OPR CONTRIBUTIONS	$MIL,I		2.8	2.8	2.9	3.1	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2
---> 5	NON TRANSIT REVENUES	$MIL,I		16.0	16.0	17.0	17.0	18.0	18.0	18.0	19.0	19.0	19.0	20.0	20.0	20.0	21.0	21.0	21.0
	CAPITAL FUNDING (CONV.FUNDS)																		
---> 5	TDA 95I REGIONAL FORMULA (15I)	$MIL,I		17.0	18.5	20.6	22.3	24.0	25.8	28.2	30.2	32.4	34.7	37.1	39.7	42.7	46.0	49.4	53.2
---> 5	STA METRORAIL SET ASIDE	$MIL,I		6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---> 5	SECT 9 METRORAIL SET ASIDE	$MIL,I		20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---> 5	SECT 9:REMAINING FOR CAPITAL	$MIL,I		38.0	22.7	22.7	22.7	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9
---> 5	BENEFIT ASSESSMENT DISTRICT	$MIL,I		60.0	25.0	25.0	20.3	20.0	20.0	0.0	10.0	0.0	10.0	0.0	0.0	0.0	0.0	10.0	0.0
---> 5	PROPA 15I (DEVERTED FOR BONDS)	$MIL,I		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---> 5	PROPA 25I LOCAL RETURN TO L.A.	$MIL,I		27.6	29.9	33.4	36.2	38.9	41.8	45.6	48.9	52.5	56.2	60.1	64.4	69.2	74.4	80.0	86.1
---> 5	GOVY 50I POP FORMULA LACTC DISCR	$MIL,I		21.6	21.4	21.2	21.0	20.8	20.7	20.5	20.4	20.3	20.2	20.2	20.1	20.1	20.0	19.9	19.8
---> 5	GOVY 50I CTC DISCR	$MIL,I		50.3	50.0	49.8	49.6	49.5	49.4	49.3	49.4	49.3	49.3	49.3	49.4	49.5	49.5	49.5	49.5
---> 5	SECT 3 TO LA (UTA W/POP)(M ONLY)	$MIL,I		132.8	132.8	135.3	134.6	134.3	133.8	133.4	133.3	133.0	132.8	132.7	132.9	133.0	133.0	132.8	132.6
---> 5	SECT 3 TO LA (SEC 9&10 FORMULA)	$MIL,I		46.9	46.9	47.8	47.5	47.4	47.2	47.1	47.1	46.9	46.9	46.9	46.9	47.0	46.9	46.9	46.8
	CAPITAL FUNDING (EXNOV:FINANCE)																		
---> 6	PROPA RAIL PROGRAM	$MIL,I		0.0	337.3	390.1	390.9	93.8	82.7	108.5	94.3	102.5	104.0	111.3	120.0	136.7	148.0	159.1	170.9
	OPERATING COSTS																		
---> 7	OPERATING COSTS (BUS)	I $MIL		455.5	491.1	533.3	578.7	626.6	672.7	624.9	638.8	651.5	701.5	755.0	812.2	836.8	899.6	966.8	1038.6
---> 7	OPERATING COSTS (HEAVY RAIL)	I $MIL		0.0	0.0	0.0	0.0	0.0	0.0	23.6	38.1	54.1	57.1	60.2	63.5	84.5	89.1	94.0	99.2
---> 7	OPERATING COSTS (LIGHT RAIL)	I $MIL		0.0	0.0	0.0	0.0	0.0	0.0	19.4	20.5	34.0	35.9	37.9	40.0	42.2	44.5	46.9	49.5
	CAPITAL COSTS																		
---> 9	BUS ACQUI/REPL/BUSWAY CONSTR	I $MIL		3.0	32.6	35.2	50.6	0.0	48.6	15.0	55.4	88.9	95.2	112.5	72.7	110.7	104.9	113.5	120.1
---> 9	METRORAIL	I $MIL		104.2	534.7	358.3	289.8	347.6	253.1	161.1	180.3	245.8	243.3	185.1	97.9	182.2	352.8	349.2	265.7
---> 9	LIGHT RAIL TRANSIT	I $MIL		0.0	77.3	148.9	146.7	153.1	129.8	58.1	29.9	0.0	0.0	0.0	0.0	0.0	0.0	308.8	415.2
---> 9	BUILDINGS/EQUIP/LAND	I $MIL		42.8	32.6	32.8	41.9	30.3	34.9	37.5	40.3	43.3	46.7	50.1	53.9	58.0	62.3	67.8	72.0

ASSUMPTIONS: PROP A RAIL PROGRAM : 35I RAIL SET ASIDE UTILIZED TO PROVIDE BONDS FOR FUNDING
FED GENERAL FUND 15I REDUCTION FIRST YEAR THEN STEADY
1 CENT FED FUEL TAX TO SECT 3;REQUIRED AMOUNT IDENTIFIED TO FUND 50I OF METRORAIL AS DEFINED IN REGIONAL PLAN
100I DISCR GUIDEWAY FUND THRU FY89

A. OPERATING COSTS AND REVENUES

I. OPERATING COSTS

METRO OPERATING COSTS	0.0	0.0	0.0	0.0	0.0	0.0	23.6	38.1	54.1	57.1	60.2	63.5	84.5	89.1	94.0	99.2
LIGHT RAIL OPERATING COSTS	0.0	0.0	0.0	0.0	0.0	0.0	19.4	20.5	34.0	35.9	37.9	40.0	42.2	44.5	46.9	49.5
BUS OPERATING COSTS	455.5	491.1	533.3	578.7	626.6	672.7	624.9	638.8	651.5	701.5	755.0	812.2	836.8	899.6	966.8	1038.6
TOTAL OPERATING COSTS	455.5	491.1	533.3	578.7	626.6	672.7	667.9	697.4	739.7	794.5	853.1	915.8	963.5	1033.2	1107.8	1187.3

II. OPERATING REVENUES

FARE BOI REVENUES	112.4	195.9	249.5	301.4	326.9	351.6	415.5	455.0	490.6	530.3	575.0	623.1	674.6	730.0	825.4	892.6
AUX REV/LOCAL OPR CONTRIBUTIONS	2.8	2.8	2.9	3.1	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2
NON TRANSIT REVENUES	16.0	16.0	17.0	17.0	18.0	18.0	18.0	19.0	19.0	19.0	20.0	20.0	20.0	21.0	21.0	21.0
TOTAL REVENUES	131.0	214.7	269.4	321.5	348.9	373.8	437.9	478.6	514.4	554.3	600.2	648.5	700.2	756.8	852.4	919.8
OPERATING BALANCE	-324.4	-276.5	-263.9	-257.2	-277.7	-298.9	-230.0	-218.8	-225.3	-240.2	-252.9	-267.3	-263.3	-276.5	-255.4	-267.5
FARE BOI RATIO	0.29	0.44	0.51	0.56	0.56	0.56	0.66	0.69	0.70	0.70	.0.70	0.71	0.73	0.73	0.77	0.77

III. OPERATING GRANTS

LOCAL OPERATOR CONTRIBUTION																	
STA REMAINING ALLOC	11.0	10.3	5.8	3.4	2.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
TDA 85I	96.5	104.6	116.8	126.6	136.1	146.2	159.7	171.2	183.9	196.7	210.4	225.2	242.2	260.4	280.1	301.2	
---)RTD SECTION 9 OPER	47.4	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	
PROP A 40I DISCR	173.3	95.1	106.2	115.2	123.8	133.0	145.3	155.8	167.3	179.0	191.5	204.9	220.3	237.0	254.9	274.1	
TOTAL OPERATING GRANTS	328.2	257.3	276.1	292.5	309.2	327.3	352.3	374.3	398.5	422.9	449.2	477.5	509.8	544.7	582.3	622.6	
OPER $ REMAINING FOR CAP GRANTS	3.7	-19.2	12.2	35.3	31.5	28.3	122.3	155.5	173.2	182.8	196.3	210.2	246.6	268.3	326.9	355.1	

B. CAPITAL COSTS AND FUNDING

IV. CAPITAL COSTS

METRO RAIL CP	104.2	534.7	358.3	289.8	347.6	253.1	161.1	180.3	245.8	243.3	185.1	97.9	182.2	352.8	349.2	265.7	
LIGHT RAIL CP	0.0	77.3	148.9	146.7	153.1	129.8	58.1	29.9	0.0	0.0	0.0	0.0	0.0	0.0	308.8	415.2	
BUS ACQUISITION/REPLACEMENT	3.0	32.6	35.2	50.6	0.0	48.6	15.0	55.4	88.9	95.2	112.5	72.7	110.7	104.9	113.5	120.1	
BUILDINGS/OFFICE EQUIPMENT/LAND	42.8	32.6	32.8	41.9	30.3	34.9	37.5	40.3	43.3	46.7	50.1	53.9	58.0	62.3	67.8	72.0	
TOTAL CAPITAL COSTS	150.1	677.1	575.3	529.1	530.9	466.4	271.7	306.0	378.0	385.1	347.7	224.5	350.9	520.1	839.3	873.0	

V. CAPITAL GRANTS

OPER $ REMAINING FOR CAP GRANTS	3.7	0.0	12.2	35.3	31.5	28.3	122.3	155.5	173.2	182.8	196.3	210.2	246.6	268.3	326.9	355.1	
PROP A RAIL PROGRAM	0.0	337.3	390.1	390.9	93.8	82.7	108.5	94.3	102.5	104.0	111.3	120.0	136.7	148.0	159.1	170.9	
STA METRORAIL SET ASIDE	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
TDA 15I	17.0	18.5	20.6	22.3	24.0	25.8	28.2	30.2	32.4	34.7	37.1	39.7	42.7	46.0	49.4	53.2	
BENEFIT ASSESSMENT	60.0	25.0	25.0	20.3	40.0	20.0	0.0	10.0	0.0	10.0	0.0	0.0	0.0	0.0	10.0	0.0	
30I CITY OF L.A. PROPA	8.3	9.0	10.0	10.9	11.7	12.5	13.7	14.7	15.8	16.9	18.0	19.3	20.8	22.3	24.0	25.8	
GUIDEWAY FUND	63.2	72.0	56.3	57.5	57.0	20.7	20.5	20.4	20.3	20.2	20.2	20.1	20.1	20.0	19.9	19.8	
---)RTD SECTION 9 CAPITAL	58.0	42.7	42.7	42.7	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	
---)RTD SECTION 3 DISCR (REQUIRED)	52.1	267.4	179.2	144.9	173.8	126.5	80.5	90.1	122.9	121.6	92.6	49.0	91.1	176.4	174.6	132.9	
TOTAL CAPITAL GRANTS	0.0	268.3	771.7	736.0	724.7	471.6	356.4	413.6	455.2	507.0	530.0	515.3	498.2	597.8	720.9	803.9	797.6
BALANCE	0.0	118.2	94.6	160.7	195.7	-59.3	-110.0	141.9	149.2	128.9	144.9	167.6	273.7	246.8	200.8	-35.4	-75.4
CUMULATIVE BALANCE	0.0	118.2	212.8	373.5	569.2	509.9	400.0	541.9	691.1	820.0	964.9	1132.5	1406.2	1653.0	1853.8	1818.4	1742.9

GENERAL PLANNING CONSULTANT:

TECHNICAL MEMORANDUM 86.5.1

FY 86 CALIBRATION OF THE BUS OPERATING COST MODEL

DRAFT

Prepared for:

Southern California Rapid Transit District

Prepared by:

Schimpeler Corradino Associates

in association with

Barton-Aschman Associates, Inc.
Cordoba Corporation
Myra L. Frank & Associates
Manuel Padron
The Planning Group, Inc.

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1. INTRODUCTION

1.1 BACKGROUND

Technical Memorandum 5.1.2 (June 1984) described the original specification of an SCRTD bus operating cost model. The purpose of this additional report is to document an update of the June, 1984 calibration of the model to FY 1986. This Technical Memorandum provides the detailed allocation of costs by category, as discussed below, and also describes those items that represent significant departures from the original FY 1984 calibration.

This bus operating cost model is designed to allow the District to compute the operating expenses for bus operation associated with either increases or decreases in service. The model generates these estimates from projections of annual bus operating statistics based upon the quantity of service for the whole SCRTD system (i.e. a summation of the data for each specific route).

1.2 OVERVIEW OF THE MODEL STRUCTURE

Historically, most bus operating cost models have used level-of-service variables as the basis of the model and have selected those variables primarily from vehicle hours, vehicle miles, passenger boardings, number of pullouts, peak vehicle requirements, and revenue. Statistical analyses of bus operating costs have generally shown high correlations of cost with most of these variables, and conceptual arguments can be made for why various elements of the operating costs should be expected to relate to one or more of these variables. This cost model is based on selecting a set of level-of-service variables that meet several criteria:

1) the variables can be output from or derived from standard urban transportation simulation procedures for long-range forecasting

2) the variables are sufficient to forecast costs on all line items of the budget

3) the variables provide responsiveness to different types of service that may be offered, and to changes in service profile

Criterion 1 leads to a rejection of a variable such as pullouts, which is not readily derived from long-range forecasting techniques. Criterion 2 involves some application of judgment. It seems clear that vehicle hours and vehicle miles alone are unlikely to be adequate; for example, costs such as for bus cleaning are explained better by a fleet size measure than by miles and hours; while fare clerks, timetables, and transit police are explained best by numbers of passengers. Criterion 3 also suggests use of additional variables that would provide some differentiation between services offered throughout the day and peak-period-only services.

Cost-allocation models of operating costs have invariably taken the relatively simple approach to modeling by assuming that any budget item

or expenditure line item can be set to vary with one level-of-service variable. While it could be argued that a number of line items are probably a function of more than one variable, decisions on how to split the effects on two or more variables and establishing a modeling mechanism that would ensure consistency in the use of such split allocations would lead to a very complex model. To date, it has not been established that an increase in model accuracy and realism would be achieved that would justify the added complexity.

Based on these criteria, it was the judgment of the developers of this model that the following four level-of-service measures be used for the model:

1) annual vehicle miles
2) annual service hours
3) average weekday p.m. peak vehicles
4) annual passenger boardings

The model is a fixed/variable cost allocation model, as described in Technical Memorandum 5.1.2, dated June 1984. The basic concept of this approach is to allocate the cost of each element of service to one of the level-of-service measures. The different elements of service are defined as the individual reported line items of expenditure, or groupings of these. It is possible to allocate costs only to the finest level of detail in expenditure or budget reports for District operations.

To calibrate the model, it is necessary first to review the allocations and determine if any service costs should be allocated differently from the original model. Allocation of each cost to one service measure requires judgment. There is always the potential need to reconsider the allocation of certain cost items, and there is the possibility that new line items may be introduced in a subsequent year's budget. Thus, it is advisable to reevaluate the individual line-item cost allocation.

Second, the budget lines and the amounts of service for the calibration year need to be determined. From these, the coefficients are recalculated and the step sizes for stepwise variables are also recalculated. The coefficients are determined by computing, for each line item in the budget or expenditure report, a unit cost equal to the amount of the budget or expenditure line divided by the value of the variable to which the line item is allocated. These individual unit costs are summed for each of the level-of-service variables and define the coefficients. Thus, if Body Shop Wages in Central Maintenance equal $1,053,000 and these are allocated to Vehicle Miles, with a base value of 107,465,000, the unit cost of Body Shop Wages would be $0.00980. The unit costs of all other line items allocated to Vehicle Miles would then be summed to produce the coefficient of Vehicle Miles.

These two activities comprise the calibration of the model. Once the costs are determined and allocated, the coefficients (unit costs) are computed to produce a model of the form:

$$\$COST = a1\ VMT + a2\ VHT + a3\ PKBS + a4\ PASS$$

where:

VMT = Annual Vehicle Miles of Travel
VHT = Annual Vehicle Hours of Travel
PKBS = Average p.m. weekday Peak Bus Requirement
PASS = Annual Passenger Boardings

For FY 1984, the cost allocation model was:

$$\$COST = 1.063*VMT + 24.390*VHT + 55969*PKBS + 0.0744*PASS$$

All unit costs are in dollars in this equation, and are based on FY 1984 dollars (i.e. dollars at about December 1984).

For FY 1986, the recalibrated model is:

$$\$COST = 0.97*VMT + 25.82*VHT + 68088*PKBS + 0.1162*PASS$$

In this case, unit costs are in calendar 1985 dollars.

2. INPUT DATA BASE

2.1 OPERATING COSTS

The bus operating costs in the recalibrated model are based on the current SCRTD organization, the SCRTD departments, and the projected account expenditures for Fiscal Year 1986. The Annual Budget for FY 1986 was used as the basic resource document. In addition, the June 1985 Revenue and Expense Statement and input from the appropriate departments were used to subdivide some items of labor into more detailed components, and to provide estimates of the labor resources and costs for these.

2.2 OPERATING STATISTICS

The projected operating statistics were supplied by SCRTD for the FY 1986 operations. These statistics were used to calibrate the model for the FY 1986 base year. The specific statistics are:

Annual Vehicle Miles:	107,465,000
Annual Vehicle Hours:	7,585,000
Annual Unlinked Passenger Trips:	424,400,000
Average Weekday P.M. Peak Vehicles :	1,987

The vehicle miles and vehicle hours are total miles and hours in this calibration, as compared to revenue miles and revenue hours used in the original FY 1984 calibration and reported in Technical Memorandum 5.2.1. Conversion can be made between the two by using the ratio for FY 1984 of each of revenue miles and hours to total miles and hours, respectively. Based on Section 15 Reports for FY 1984, these ratios are:

Vehicle Miles (Revenue:Total) = 0.8763
Vehicle Hours (Revenue:Total) = 0.9253

2.3 STEP SIZES

Step sizes are defined for those expenditure categories where costs vary with the level-of-service variable by increments, rather than continuously. For example, wages and fringes for operators (drivers) are allocated to vehicle hours. However, each saving of a vehicle hour does not generate a saving of operator costs, given procedures of assigning operators to service and union and contract rules. In the model, it is assumed that a cost saving or an additional cost outlay is involved each time the change amounts to the equivalent of one half-time operator for the year. This change, in FY 1986, is estimated to occur when there is a saving of 853 vehicle hours. If a change in vehicle hours smaller than this amount takes place, no change in operator cost will be obtained. If a change larger than 853 hours annually is projected, a change in cost is assumed to occur. The change is determined by dividing the total projected change in vehicle hours by 853, and truncating the result to an integer value. This integer value represents the number of half-time operators saved by the change in vehicle hours. The cost savings are estimated by multiplying this number by 853 and then multiplying the

product by the unit cost of operator wages and fringes. Two numerical examples should serve to illustrate the process.

With Operator Wages determined to have a FY 1986 unit cost of $18.40 per vehicle hour, and Operator Fringes of $4.33:

1. Cost savings from a reduction of 500 vehicle hours annually:

   This value falls below the step size of 853 hours and therefore is assumed to provide no savings in operator wages and fringes.

2. Cost savings from a reduction of 10,000 vehicle hours annually:

   The value of 10,000 is divided by 853, yielding the result of 11.72. This is truncated to an integer value of 11, indicating that 11 half-time equivalent operators can be saved by this reduction. Further, 11 half-time operators work 9,383 vehicle hours annually, and this is the number of vehicle hours for which there will be a cost saving. Total cost savings from operator wages and fringes are obtained by multiplying $18.40 and $4.33 by 9,383, for a savings estimate of $1,726,472 in wages and $40,628.39 in fringes. Note that the further reduction of 617 (10,000 - 9,383) hours produces no additional cost savings on operators.

Step sizes are based on the primary categories of 1) an employee, 2) an operating division, and 3) a bus facility. Table 1 summarizes the step-size differences between FY 1984 and FY 1986 for these primary categories.

Because the number of employees at the District varies from Department to Department and from category to category, the step size (in miles, hours, buses, or passengers) also varies from Department to Department and from category to category. It can be seen that the size of an operating division decreased from FY 1984 to FY 1986, with the average number of peak buses per operating division decreasing from 159 to 153. Similarly, the average size of a maintenance operating division decreased from 172 peak buses in FY 1984 to 153 in FY 1986.

Apart from these rather clear, recurrent step sizes, most of the remainder relate to employees in the Department or category, and show fluctuations between FY 1984 and FY 1986, in response to changes in the numbers of employees between FY 1984 actual employment and FY 1986 projected employment. In addition, there are changes in budgeting and organization that show up most strongly in Central Maintenance, where six line items from FY 1984 do not appear in the FY 1986 budget, while ten new line items appear in FY 1986. There is also a consistent change throughout the FY 1986 budgeting that Utilities are no longer separated from Miscellaneous Expenses, as they were in FY 1984.

TABLE 1

COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS	FY84	FY86
Miles	Maintenance Oper. Div. - Inspectors	1,251,605	2,149,300
	Maintenance Oper. Div. - Road Failure	N/I	17,910,833
	Maintenance Oper. Div. - Running Rep.	154,169	178,810
	Central Maintenance - Body Shop	N/I	3,358,281
	Central Maintenance - Body & Frame	1,463,415	N/I
	Central Maintenance - Cylinder Head	N/I	5,656,053
	Central Maintenance - Engine Line	N/I	3,980,185
	Central Maintenance - Engine Parts	N/I	13,433,125
	Central Maintenance - Engine Rebuild	2,439,026	N/I
	Central Maintenance - Engine Teardown	9,512,200	13,433,125
	Central Maintenance - Electrical Units	N/I	3,160,735
	Central Maintenance - Electrical Shop	2,972,563	N/I
	Central Maintenance - Frame Shop	N/I	8,266,538
	Central Maintenance - Machine Shop	7,317,077	7,676,071
	Central Maintenance - Mechanical Units	N/I	2,904,459
	Central Maintenance - Misc. Repair	31,707,333	N/I
	Central Maintenance - Paint Shop	2,320,049	5,656,053
	Central Maintenance - Radiator Shop	11,890,250	N/I
	Central Maintenance - Running Repairs	3,280,069	2,755,513
	Central Maintenance - Sheet Metal Shop	7,926,833	7,676,071
	Central Maintenance - Sign Shop	N/I	21,493,000
	Central Maintenance - Small Unit Shop	3,523,037	N/I
	Central Maintenance - Systems Shop	N/I	9,769,545
	Central Maintenance - Tool & Unit Room	N/I	26,866,250
	Central Maintenance - Transmission	3,280,069	3,582,167
	Central Maintenance - Welding Shop	6,794,429	4,477,708
	Central Maintenance - Upholstery Shop	6,341,467	8,266,538
	Non-Departmental - Workman's Comp.	59,451	69,332
	Non-Departmental - Provisions for Uninsured PD	39,634 @ $634	107,465 @ $2,531
	Non-Departmental - Expenses for PD	39,634 @ $456	107,465 @ $524
Hours	Transportation Oper. Div. - Operators	777	853
	Transportation Services - Street Superv.	476,800	421,400
	Transportation Instruction - Instructors	447,000	474,000
	Maintenance Oper. Div. - Non-revenue Wages	264,889	216,714

TABLE 1 (continued)

COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS	FY84	FY86
Hours (continued)			
	Transit Police - Transportation Service	420,706	446,176
	Scheduling Dept. - Schedule Maker Wages	596,000	329,783
	Accounting & Fiscal - Payroll Clerk	447,000	632,083
	Non-Departmental - Workman's Comp.	777	853
Peak Buses	Transportation Oper. Div. - Divisional Wages	159	153
	Transportation Oper. Div. - Services	159	153
	Transportation Oper. Div. - Materials & Supp.	159	153
	Transportation Oper. Div. - Utilities	159	N/I
	Transportation Oper. Div. - Misc. Expenses	159	153
	Transportation Services - Radio Dispatchers	159	153
	Transportation Services - Utilities	159	N/I
	Transportation Instruction- Divisional Wages	172	N/I
	Maintenance Oper. Div. - Service Deep Clean	32	33
	Maintenance Oper. Div. - Servicing	5.6	5.8
	Maintenance Oper. Div. - Servicing Supervisor	188	153
	Maintenance Oper. Div. - Wheelchair Maint.	34.4	33.1
	Maintenance Oper. Div. - Farebox Maintenance	206	60.2
	Maintenance Oper. Div. - Campaigns & Reserve	60.7	N/I
	Maintenance Oper. Div. - Supervision & Admin.	172	153
	Maintenance Oper. Div. - Special Projects	N/I	110
	Maintenance Oper. Div. - Training & Oth.Fringe	172	153
	Maintenance Oper. Div. - Services for Div.	172	153
	Maintenance Oper. Div. - Tools & Exp. Equip.	172	Direct by Miles
	Maintenance Oper. Div. - Other Mat. & Supp.	172	N/I
	Maintenance Oper. Div. - Utilities	172	N/I
	Maintenance Oper. Div. - Miscellaneous Exp.	172	153
	Central Maintenance - Service Wages	121	117
	Central Maintenance - Central Shop Superv.	138	166
	Facilities Maintenance - Electrical Maint.	147	142
	Facilities Maintenance - Property Maint.	147	142
	Facilities Maintenance - Electronic Maint.	N/I	47
	Facilities Maintenance - Materials & Supplies	147	142

TABLE 1 (continued)

COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS	FY84	FY86
Peak Buses	(continued)		
	Maintenance General - Instruction	188	142
	Telecommunications - Electronic Maintenance	56	N/I
	Scheduling - Checkers	40.5	31.5
	Contract Procurement - Stores	159	153
Passengers	Transit Police - Passenger Security	13,688,235	12,482,353
	Marketing & Comm. - Ticket Clerks	21,154,545	19,290,909
	Customer Relations - Telephone Clerks	4,951,064	4,715,555
	Accounting & Fiscal - Cash Clerks	16,621,429	12,860,606
	Nondepartmental - Provisions for Uninsured PL	101,174 @ $4,916	163,231 @ $14,481
	Nondepartmental - Expenses for PL	101,174 @ $456	163,231 @ $524

2.4 DIRECTLY-VARIABLE ITEMS

Directly-variable items are much simpler than stepwise variable items. These are expenditures that can be assumed to vary with every increment or decrement of the level-of-service variable to which they are allocated. For example, fuel is allocated to vehicle miles as a directly-variable item, with a unit cost of $0.2521 in FY 1986. By allocating fuel as a directly-variable item, it is assumed that each change of a vehicle mile will produce a cost change of $0.2521. Thus, a decrease of 1,000 vehicle miles will save $252.10, and an increase of 10,000 vehicle miles will increase costs by $2,521.

The model contains very few line items that are assumed to vary directly with one of the variables used in the model. Table 2 shows the line items that are assumed to vary directly for each of FY 1984 and FY 1986. The differences between FY 1984 and FY 1986 are minor: under Maintenance Operating Divisions, the Expendable Equipment for Revenue Vehicles is not split into component entries in FY 1986, but is in FY 1984; and Telecommunications equipment on revenue vehicles has moved from the Telecommunications Department to Facilities Maintenance between FY 1984 and FY 1986. Essentially, these changes have no net effect on the allocation of costs to direct variables.

TABLE 2

COMPARISON OF DIRECTLY VARIABLE ITEMS BETWEEN FY84 AND FY86

VARIABLE	LINE ITEM	FY84	FY86
Miles	Maintenance Operating Div. - Expendable Equipment for Revenue Vehicles	No	Yes
	Maintenance Operating Div. - Lubricants (Rev. Veh.)	Yes	No
	Maintenance Operating Div. - Tires & Tubes (Rev Veh)	Yes	No
	Maintenance Operating Div. - Bus Parts (Rev. Veh.)	Yes	No
	Nondepartmental Expenses - Fuel	Yes	Yes
	Nondepartmental Expenses - Fuel & Lube Taxes (Rev.)	Yes	Yes
Hours		None	None
Peak Buses	Telecommunications - Mat.& Supp.(Revenue Equip.)	Yes	No
	Facilities Maint. - Mat. & Supplies (Radio)	No	Yes
Passengers	Print Shop - Timetables	Yes	Yes

2.5 FIXED ITEMS

All remaining budget line items are considered to be fixed costs, and these are allocated, for fully-allocated costing at the line level, to one of the four variables used by the model. Unit costs are computed, as for the other expenditure items, for each line item that is defined as a fixed cost. If a change in service is examined, by definition there will be no changes to total fixed costs. Therefore, the unit cost of each fixed-cost item is recomputed, to yield the same total fixed cost for before the change in service.

Thus, for example, Wages for the General Manager's office are assigned as a fixed cost to peak buses, with a FY 1986 unit cost of $179.668. If a service change is examined that will reduce peak buses from the FY 1986 value of 1987 (buses for the average p.m. weekday peak) to 1968, the unit cost for Wages for the General Manager's office will increase to $181.402.

Rather than provide a detailed listing of all fixed-cost items for each year, Table 3 documents the differences between FY 1984 and FY 1986 in the make-up of line items and their allocation for the purposes of line costing. The general change, mentioned in Section 2.3 above, of combining Utilities into Miscellaneous Expenses or charging them under Nondepartmental Expenses in FY 1986 instead of keeping as a separate line item by department as in FY 1984, is not included in this table, because it happens consistently in all departments and generally represents no net change in the amounts allocated.

Several of the entries in Table 3 represent minor budget changes between FY 1984 and FY 1986. For example, inclusion of a "Services" or a "Miscellaneous Expenses" line item in several departments in one year and not the other indicates merely a zero budget line on that item for the year where it is omitted.

Table 3 also shows evidence of some reorganization within the SCRTD, but without any change in the allocation variable for the fixed costs. For example, the Human Relations Department has changed to an Equal Employment Opportunity Department and a DBE/WBE Department. Telecommunications has been absorbed into Facilities Engineering, and new departments for Transit Systems Development, Risk Management, and Contract Compliance have been added.

There are also a few additional changes in detail in the allocations used that do not affect the underlying process. Several departments allocated to fixed costs have detailed itemized costs in the FY 1984 expenditures reports, using categories of Services, Materials and Supplies, and Miscellaneous Expenses. In the FY 1986 budget materials, treatment of these has been simplified to a category of "Non-Labor Expenses."

TABLE 3

DIFFERENCES IN ALLOCATION OF FIXED-COST ITEMS BETWEEN FY84 AND FY86

LINE ITEM	ALLOCATION VARIABLE FY84	FY86
Stops & Zones - Miscellaneous Expenses	-	Peak Buses
Transportation Instruction - Services	Peak Buses	-
Maintenance Operating - Servicing Fringes Fixed	Peak Buses	*
Central Maintenance - Training and Other Fringes	Peak Buses	*
Central Maintenance - Services	Peak Buses	*
Central Maintenance - Miscellaneous Expenses	Peak Buses	*
Telecommunications - Administration Wages	Peak Buses	#
Telecommunications - Fringes	Peak Buses	#
Telecommunications - Services	Peak Buses	#
Telecommunications - Materials & Supplies	Peak Buses	#
Telecommunications - Utilities & Misc. Exp.	Peak Buses	#
A.G.M. for Planning & Comm. - Services	Peak Buses	-
Human Relations - Wages	Peak Buses	-
Human Relations - Fringes	Peak Buses	-
Human Relations - Services	Peak Buses	-
Human Relations - Materials & Supplies	Peak Buses	-
Human Relations - Utilities & Misc. Exp.	Peak Buses	-
Equal Employment Opp. - Wages	-	Peak Buses
Equal Employment Opp. - Fringes	-	Peak Buses
Equal Employment Opp. - Materials and Supplies	-	Peak Buses
Equal Employment Opp. - Utilities & Misc. Exp.	-	Peak Buses
Contract Compliance - Wages	-	Peak Buses
Contract Compliance - Fringes	-	Peak Buses
Contract Compliance - Materials and Supplies	-	Peak Buses
Contract Compliance - Utilities & Misc. Exp.	-	Peak Buses
DBE/WBE - Wages	-	Peak Buses
DBE/WBE - Fringes	-	Peak Buses
DBE/WBE - Materials and Supplies	-	Peak Buses
DBE/WBE - Utilities & Misc. Exp.	-	Peak Buses

* Not Separated from nondepartmental expenses in FY 1986.
\# Department reassigned under Facilities Maintenance in FY 1986.

TABLE 3 (continued)

DIFFERENCES IN ALLOCATION OF FIXED-COST ITEMS BETWEEN FY84 AND FY86

LINE ITEM	ALLOCATION VARIABLE FY84	FY86
AGM for Transit System Dev. - Materials and Supplies	Peak Buses	-
AGM for Transit System Dev. - Utilities & Misc. Exp.	Peak Buses	-
AGM for Management - Services	-	Peak Buses
Employee Activities - Fringes	*	Peak Buses
Transit System Dev. - Wages	-	Peak Buses
Transit System Dev. - Fringes	-	Peak Buses
Transit System Dev. - Materials and Supplies	-	Peak Buses
Transit System Dev. - Utilities & Misc. Exp.	-	Peak Buses
Risk Management - Wages	-	Peak Buses
Risk Management - Fringes	-	Peak Buses
Risk Management - Materials and Supplies	-	Peak Buses
Risk Management - Utilities & Misc. Exp.	-	Peak Buses

* Not Separated from nondepartmental expenses in FY 1986.
\# Department reassigned under Facilities Maintenance in FY 1986.

3. FY 1986 CALIBRATION OF COST ALLOCATION

3.1 ALLOCATION OF COSTS

Table 4 shows the complete itemization of the FY 1986 budget items and their allocation to the four variables and three types of allocation relationship. This table may be compared directly with Table 1 in Technical Memorandum 5.1.2 (June, 1984) to confirm the various differences pointed out in the foregoing sections. The Table shows the allocation of a Projected FY 1986 budget of $484,174,000, compared to the earlier allocation of an Estimated FY 1984 budget of $425,697,000.

It is important to note that the FY 1986 Cost Allocation is based on a projected (not actual) budget and for a slightly reorganized structure for SCRTD. The FY 1984 cost allocation was based on actual expenditures for three of the four quarters in FY 1984, plus estimates of the remaining expenditures in FY 1984. Similarly, the hours, miles, and passengers are annual totals for FY 1986 that are projected, while for FY 1984 they were actuals for three quarters and estimates for the last quarter. Peak buses are based on weekday p.m. peak actuals for the first 9 months of FY 1984 and are projected for FY 1986.

Applying the FY 1984 coefficients (adjusted from revenue hours and miles to total miles and hours), the projected FY 1986 cost in 1984 dollars would be $414,137,000.

3.2 INFLATION EFFECTS

The change in CPI for the Los Angeles-Long Beach area between mid FY 1984 (December 1983) and the end of FY 1986 (which is the time for which the budget is assumed to be correct) in June 1986 is 11.285%. Applying this change to the annual expenditure for FY 1984 would project FY 1986 costs of $460,873,000. This percentage change provides a budget figure that requires an additional adjustment of 5.0558% to match the projections made for FY 1986. Applying the total of these two adjustments to the unit costs from the FY 1984 model produces the estimates shown in Table 5. As expected, the annual costs would then be projected as $484,152,000, which is (within rounding error) the result that should be achieved.

Of much more interest is to observe that the inflation adjustment provides coefficients for miles and hours that are marginally higher than the calibrated values for FY 1986, while the other two coefficients are underestimated for FY 1986. No correction has been made in this process for changes to the miles, hours, buses, and passengers variables that would require spreading fixed costs over a smaller base and would also adjust step sizes. The results of such adjustments are reported in a second Technical Memorandum, number 86.5.2 (November, 1985).

Table 4
BUS COST ALLOCATION

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Board of Directors								
Wages	0			X		X		
Fringes	0			X		X		
Services	73			X		X		
Materials and Supplies	5			X		X		
Miscellaneous Expenses	67			X		X		
General Manager								
Wages	357			X		X		
Fringes	0			X		X		
Services	211			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	41			X		X		
Office of District Secretary								
Wages	274			X		X		
Fringes	0			X		X		
Services	55			X		X		
Materials and Supplies	9			X		X		
Miscellaneous Expenses	49			X		X		
Legal								
Wages	392			X		X		
Fringes	4			X		X		
Services	330			X		X		
Materials and Supplies	5			X		X		
Miscellaneous Expenses	11			X		X		
Assistant General Manager for Operations								
Wages	317			X		X		
Fringes	2			X		X		
Services	0			X		X		
Materials and Supplies	7			X		X		
Miscellaneous Expenses	7			X		X		
Transportation Operating Divisions								
Wages	7,899			X			X	By 153 Peak Vehicles
Fringes	1,731			X			X	By 153 Peak Vehicles
Operator Wages	139,552	X					X	By 853 Revenue Hours
Operator Fringes	32,806	X					X	By 853 Revenue Hours
Services	1			X			X	By 153 Peak Vehicles
Materials and Supplies	97			X			X	By 153 Peak Vehicles
Miscellaneous Expenses	14			X			X	By 153 Peak Vehicles
Stops and Zones								
Wages	738			X		X		
Fringes	3			X		X		
Services	6			X		X		
Materials and Supplies	103			X		X		
Miscellaneous Expenses	1			X		X		
Operations Control and Services								
Wages	1,864			X		X		
Wages	2,523	X				X		
Wages	649	X					X	By 421,400 Hours of Service
Fringes	143	X					X	By 421,400 Hours of Service
Wages	938			X		X		
Wages	469			X			X	By 153 Peak Vehicles
Fringes	104			X			X	By 153 Peak Vehicles
Fringes	25			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Operations Control and Services (cont'd)								
Services	1			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	3			X		X		
Transportation Instruction								
Wages	748			X		X		
Wages	580	X					X	By 474,000 Hours of Service
Fringes	128	X					X	By 474,000 Hours of Service
Fringes	8			X		X		
Materials and Supplies	34			X		X		
Miscellaneous Expenses	6			X		X		
Transportation General								
Wages	575	X				X		
Fringes	11	X				X		
Services	11	X				X		
Materials and Supplies	509	X				X		
Miscellaneous Expenses	180	X				X		
Maintenance Operating Divisions								
Servicing Deep Clean Wages	1,538			X			X	By 33 Peak Vehicles
Servicing Deep Clean Fringes	375			X			X	By 33 Peak Vehicles
Servicing Wages	8,789			X			X	By 5.8 Peak Vehicles
Servicing Fringes	2,155			X			X	By 5.8 Peak Vehicles
Servicing Supervisor Wages	428			X			X	By 153 Peak Vehicles
Servicing Supervisor Fringes	100			X			X	By 153 Peak Vehicles
Wheelchair Maintenance Wages	1,974			X			X	By 33.1 Peak Vehicles
Wheelchair Maintenance Fringes	438			X			X	By 33.1 Peak Vehicles
Non-Revenue Wages	970	X					X	By 216,714 Hours
Non-Revenue Fringes	234	X					X	By 216,714 Hours
Farebox Maintenance Wages	1,086			X			X	By 60.2 Peak Vehicles
Farebox Maintenance Fringes	240			X			X	By 60.2 Peak Vehicles
Inspection Wages	1,645		X				X	By 2,149,300 Miles
Inspection Fringes	364		X				X	By 2,149,300 Miles
Running Repair Wages	19,773		X				X	By 178,810 Miles
Running Repair Fringes	4,379		X				X	By 178,810 Miles
Supervision and Administration Wages	6,587			X			X	By 153 Peak Vehicles
Supervision and Administration Fringes	1,316			X			X	By 153 Peak Vehicles
Road Failure Wages	197		X				X	By 17,910,833 Miles
Road Failure Fringes	44		X				X	By 17,910,833 Miles
Special Projects Wages	592			X			X	By 110 Peak Vehicles
Special Projects Fringes	131			X			X	By 110 Peak Vehicles
Servicing Wages Fixed	282			X		X		
Training and Other Fringe Benefits	637			X			X	By 153 Peak Vehicles
Services for Divisions	285			X			X	By 153 Peak Vehicles
Lubricants, Tires and Tubes, Bus Parts, and Tools and Expendable Equipment for Revenue Equipment	25,421		X				X	Directly By Miles
Miscellaneous Expenses	123			X			X	By 153 Vehicles
Central Maintenance								
Running Repair Wages	1,283		X				X	By 2,755,513 Miles
Running Repair Fringes	284		X				X	By 2,755,513 Miles
Engine Teardown Wages	263		X				X	By 13,433,125 Miles
Engine Teardown Fringes	58		X				X	By 13,433,125 Miles
Cylinder Head Wages	625		X				X	By 5,656,053 Miles
Cylinder Head Fringes	138		X				X	By 5,656,053 Miles
Engine Line Wages	888		X				X	By 3,980,185 Miles
Engine Line Fringes	197		X				X	By 3,980,185 Miles
Engine Parts Crib Wages	263		X				X	By 13,433,125 Miles
Engine Parts Crib Fringes	58		X				X	By 13,433,125 Miles

Table 4
BUS COST ALLOCATION (continued)

Department and Expense	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Central Maintenance (cont'd)								
Electrical Units Wages	1,119		X				X	By 3,160,735 Miles
Electrical Units Fringes	248		X				X	By 3,160,735 Miles
Mechanical Units Wages	1,217		X				X	By 2,904,459 Miles
Mechanical Units Fringes	270		X				X	By 2,904,459 Miles
Transmission Wages	987		X				X	By 3,582,167 Miles
Transmission Fringes	219		X				X	By 3,582,167 Miles
Welding Shop Wages	790		X				X	By 4,477,708 Miles
Welding Shop Fringes	175		X				X	By 4,477,708 Miles
Machine Shop Wages	461		X				X	By 7,676,071 Miles
Machine Shop Fringes	102		X				X	By 7,676,071 Miles
Body Shop Wages	1,053		X				X	By 3,358,281 Miles
Body Shop Fringes	233		X				X	By 3,358,281 Miles
Frame Shop Wages	428		X				X	By 8,266,538 Miles
Frame Shop Fringes	95		X				X	By 8,266,538 Miles
Sheet Metal Shop Wages	461		X				X	By 7,676,071 Miles
Sheet Metal Shop Fringes	102		X				X	By 7,676,071 Miles
Upholstery Shop Wages	428		X				X	By 8,266,538 Miles
Upholstery Shop Fringes	95		X				X	By 8,266,538 Miles
Systems Shop Wages	362		X				X	By 9,769,545 Miles
Systems Shop Fringes	80		X				X	By 9,769,545 Miles
Paint Shop Wages	625		X				X	By 5,656,053 Miles
Paint Shop Fringes	138		X				X	By 5,656,053 Miles
Sign Shop Wages	165		X				X	By 21,493,000 Miles
Sign Shop Fringes	36		X				X	By 21,493,000 Miles
Tool and Unit Room Wages	132		X				X	By 26,866,250 Miles
Tool and Unit Room Fringes	29		X				X	By 26,866,250 Miles
Service Wages	436			X			X	By 117 Peak Vehicles
Service Fringes	108			X			X	By 117 Peak Vehicles
Central Shop Supervision Wages	471			X			X	By 166 Peak Vehicles
Central Shop Supervision Fringes	103			X			X	By 166 Peak Vehicles
Central Shop Administration Wages	601			X		X		
Maintenance General Department								
Instruction Wages	580			X			X	By 142 Peak Vehicles
Instruction Fringes	122			X			X	By 142 Peak Vehciles
Wages	1,715			X		X		
Non-Labor Expenses	371			X		X		
Equipment Engineering Department								
Wages	618			X		X		
Non-Labor Expenses	89			X		X		
Facilities Maintenance Department								
Electrical Maintenance Wages	799			X			X	By 142 Peak Vehicles
Electrical Maintenance Fringes	174			X			X	By 142 Peak Vehicles
Property Maintenance Wages	1,546			X			X	By 142 Peak Vehicles
Property Maintenance Fringes	342			X			X	By 142 Peak Vehicles
Electronic Maintenance Wages	1,382			X			X	By 47 Peak Vehicles
Electronic Maintenance Fringes	306			X			X	By 47 Peak Vehicles
Administration and Supervision Wages	3,056			X		X		
Training and Fringe Benefits	74			X		X		
Services	58			X		X		
Materials and Supplies - Radio	150			X			X	Directly By Peak Vehicles
Materials and Supplies - Facilities	1,000			X			X	By 142 Peak Vehicles
Materials and Supplies	730			X		X		
Miscellaneous Expenses	61			X		X		
Transit Police Department								
Police Wages	941				X		X	By 12,482,353 Passengers
Police Fringes	231				X		X	By 12,482,353 Passengers
Police Wages	471	X					X	By 446,176 Hours
Police Fringes	115	X					X	By 446,176 Hours
Administrative Wages	2,740			X		X		
Fringes	71			X		X		
Services	228			X		X		
Materials and Supplies	52			X		X		
Miscellaneous Expenses	36			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Scheduling Department								
Schedule Maker Wages	786	X					X	By 329,783 Hours
Schedule Maker Fringes	181	X					X	By 329,783 Hours
Checker Wages	2,207			X			X	By 31.5 Peak Vehicles
Checker Fringes	483			X			X	By 31.5 Peak Vehicles
Wages	1,129			X		X		
Fringes	3			X		X		
Services	45			X		X		
Materials and Supplies	43			X		X		
Miscellaneous Expenses	61			X		X		
Assistant General Manager for Planning and Communications								
Wages	111			X		X		
Fringes	1			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	2			X		X		
Planning								
Wages	2,400			X		X		
Fringes	6			X		X		
Services	322			X		X		
Materials and Supplies	68			X		X		
Miscellaneous Expenses	35			X		X		
Marketing and Communications								
Ticket Clerk Wages	556				X		X	By 19,290,909 Passengers
Ticket Clerk Fringes	125				X		X	By 19,290,909 Passengers
Wages	1,468				X	X		
Fringes	16				X	X		
Services	484				X	X		
Materials and Supplies	887				X	X		
Miscellaneous Expenses	128				X	X		
Customer Relations								
Telephone Clerks Wages	2,170				X		X	By 4,715,555 Passengers
Telephone Clerks Fringes	501				X		X	By 4,715,555 Passengers
Wages	1,157				X	X		
Fringes	15				X	X		
Services	21				X	X		
Materials and Supplies	28				X	X		
Miscellaneous Expenses	14				X	X		
Assistant General Manager for Government and Community Affairs								
Wages	107			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	5			X		X		
Government Affairs								
Wages	277			X		X		
Fringes	3			X		X		
Services	86			X		X		
Materials and Supplies	7			X		X		
Miscellaneous Expenses	38			X		X		
Community Relations								
Wages	189			X		X		
Fringes	7			X		X		
Services	21			X		X		
Materials and Supplies	38			X		X		
Miscellaneous Expenses	26			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Assistant General Manager for Equal Opportunity								
Wages	83			X		X		
Services	4			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	11			X		X		
Equal Employment Opportunity								
Wages	140			X		X		
Fringes	2			X		X		
Materials and Supplies	5			X		X		
Miscellaneous Expenses	3			X		X		
Contract Compliance								
Wages	71			X		X		
Fringes	1			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	3			X		X		
Employee Education, Training and Development								
Wages	1,166			X		X		
Fringes	342			X		X		
Services	33			X		X		
Materials and Supplies	5			X		X		
Miscellaneous Expenses	11			X		X		
DBE/WBE								
Wages	74			X		X		
Fringes	1			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	3			X		X		
Controller-Treasurer-Auditor								
Wages	275			X		X		
Fringes	6			X		X		
Services	1			X		X		
Materials and Supplies	3			X		X		
Miscellaneous Expenses	13			X		X		
Accounting and Fiscal								
Payroll Clerk Wages	305	X					X	By 632,083 Hours
Payroll Clerk Fringes	68	X					X	By 632,083 Hours
Cash Clerk Wages	873				X		X	By 12,860,606 Passengers
Cash Clerk Fringes	192				X		X	By 12,860,606 Passengers
Wages	1,767			X		X		
Fringes	21			X		X		
Services	277			X		X		
Materials and Supplies	34			X		X		
Miscellaneous Expenses	11			X		X		
Data Processing								
Wages	3,515			X		X		
Fringes	43			X		X		
Services	1,332			X		X		
Materials and Supplies	251			X		X		
Miscellaneous Expenses	148			X		X		
Assistant General Manager for Transit System Development								
Wages	26			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Transit Systems Development								
Wages	1,064			X		X		
Services	155			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	3			X		X		
Bus Facilities Engineering								
Wages	353			X		X		
Fringes	9			X		X		
Services	262			X		X		
Materials and Supplies	40			X		X		
Miscellaneous Expenses	39			X		X		
Assistant General Manager for Management								
Wages	112			X		X		
Services	2			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	4			X		X		
Safety Department								
Wages	198			X		X		
Fringes	4			X		X		
Services	172			X		X		
Materials and Supplies	67			X		X		
Miscellaneous Expenses	34			X		X		
Insurance								
Wages	230			X		X		
Fringes	2			X		X		
Services	37			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	6			X		X		
Risk Management								
Wages	79			X		X		
Fringes	1			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	2			X		X		
Contract Procurement & Material								
Stores Wages	1,035			X			X	By 153 Peak Vehicles
Stores Fringes	223			X			X	By 153 Peak Vehicles
Wages	3,612			X		X		
Fringes	40			X		X		
Services	37			X		X		
Materials and Supplies	113			X		X		
Miscellaneous Expenses	64			X		X		
Personnel Department								
Wages	1,581			X		X		
Fringes	8			X		X		
Services	711			X		X		
Materials and Supplies	112			X		X		
Miscellaneous Expenses	65			X		X		
General Services								
Wages	2,143			X		X		
Fringes	4			X		X		
Services	24			X		X		
Materials and Supplies	290			X		X		
Miscellaneous Expenses	2			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department and Expense	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Print Shop								
Wages	779			X		X		
Fringes	6			X		X		
Services	76			X		X		
Timetables	476				X		X	Directly by Passengers
Materials and Supplies	24			X		X		
Miscellaneous Expenses	3			X		X		
Management and Budget								
Wages	566			X		X		
Fringes	6			X		X		
Services	3			X		X		
Materials and Supplies	9			X		X		
Miscellaneous Expenses	5			X		X		
Labor Relations								
Wages	261			X		X		
Fringes	3			X		X		
Services	43			X		X		
Materials and Supplies	10			X		X		
Miscellaneous Expenses	8			X		X		
Employee Activities								
Wages	124			X		X		
Fringes	2			X		X		
Services	1			X		X		
Materials and Supplies	7			X		X		
Miscellaneous Expenses	32			X		X		
Nondepartmental Expenses								
Wages	1,214			X		X		
Fringes	15,500			X		X		
Workman's Compensation	14,950	X					X	By 853 Hours
Workman's Compensation	5,750		X				X	By 69,332 Miles
Workman's Compensation	2,300			X		X		
Services	7,896			X		X		
Fuel	27,090		X				X	Directly by Miles
Materials and Supplies	850			X		X		
Utilities	5,206			X		X		
Premiums for Physical Damage	22			X		X		
Premiums for PL & PD Insurance	190			X		X		
Premiums for Corporate Insurance	578			X		X		
Provisions for Uninsured PL PL	37,650				X		X	By 163,231 Passengers at $14,481 Each
Provisions for Uninsured PD	2,531		X				X	By 107,465 Miles at $2,531 Each
Expenses for PL PL	1,362				X		X	By 163,231 Passengers at $524 per Step
Expenses for PD PD	524		X				X	By 107,465 Miles at $524 per Step
Fuel and Lube Taxes Non-Revenue Equipment	60	X				X		
Fuel and Lube Taxes Revenue Equipment	1,957		X				X	Directly By Miles
Leases and Rentals	7,106			X		X		
TOTAL	$484,174							

TABLE 5

COMPARISON OF COEFFICIENTS BETWEEN FY84 AND FY86, ADJUSTED FOR INFLATION

COEFFICIENT	FY84 CALIBRATION	ADJUSTED FOR INFLATION	ADJUSTED FOR REAL INCREASE	FY86 CALIBRATION
Revenue Miles	1.063	1.1830	1.243	*
Total Miles1	0.932	1.037	1.089	0.97
Revenue Hours	24.39	27.14	28.52	*
Total Hours2	22.57	25.12	26.39	25.82
Peak Buses	55,969	62,285	65,441	68,088
Passengers	0.0744	0.0828	0.0870	0.1162

* In FY 1986, no values are projected for revenue miles and revenue hours.

1. Coefficients are factored by the ratio of revenue miles to total miles in FY 1984 (93,031,164/106,163,110).

2. Coefficients are factored by the ratio of revenue hours to total hours in FY 1984 (7,062,585/7,632,855).

GENERAL PLANNING CONSULTANT:

TECHNICAL MEMORANDUM 86.5.3

SUMMARY STATISTICS FOR THE FY 1984 AND FY 1986 BUS OPERATING COST MODELS

Prepared for:

Southern California Rapid Transit District

Prepared by:

Schimpeler Corradino Associates

in association with

Barton-Aschman Associates, Inc.
Cordoba Corporation
Myra L. Frank & Associates
Manuel Padron
The Planning Group, Inc.

November, 1985

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1. INTRODUCTION

Technical Memorandum 86.5.1 (November 1985) described the specification of a SCRTD bus operating cost model, based on projected FY 1986 budget figures and expected service levels for FY 1986. An earlier Technical Memorandum 5.1.2 (June 1984) described a FY 1984 calibration of the same basic model. In this Technical Memorandum, a summary is provided of the unit costs produced by each of those two calibrations. These unit costs can be used to obtain estimates of the operating costs for alternative service-level scenarios and for individual bus lines of the SCRTD system, subject to certain constraints discussed below and within broader error bounds than would apply to a fully-programmed model embodying these calibrations.

This Technical Memorandum also provides guidance on how to use the unit costs in the calculation of operating costs. In particular, the procedure for applying the step-function unit costs is somewhat less straightforward than may at first be appreciated. A step-by-step procedure for making cost calculations is therefore provided in this document. It should also be noted that the existence in the model of step functions makes it desirable, for maximum accuracy, for service changes to be allocated to operating divisions, with changes in each of peak buses, miles, hours, and passengers being assigned to divisions.

2. SUMMARY OF UNIT COSTS

Table 1 provides a summary of the unit costs on average daily p.m. peak buses, annual revenue vehicle hours, annual revenue vehicle miles, and annual passenger boardings. The costs are provided in mid-FY 1984 dollars. All unit costs in this table are based on the organizational structure and productivity of the District during FY 1984. Thus, average operating division size in FY 1984 was 159 peak buses, while average maintenance division size was 172 peak buses. It should be noted particularly that the miles and hours variables in this table refer to revenue hours and miles and do not include deadhead and layover. These two measures are defined in the same way as Section 15 Reports on revenue hours and miles.

Table 2 provides the same information for the projected FY 1986 budget, and is based on average daily p.m. peak buses, annual scheduled vehicle hours, annual scheduled vehicle miles, and annual passenger boardings. Unit costs in Table 2 are in end-of-FY 1986 dollars, based on an assumption of 4 percent inflation from July 1985 through June 1986. Among differences between Table 1 and Table 2 are that average operating division size has dropped to 153 peak buses from 159 in FY 1984, and that average maintenance division size is now equal to operating division size at 153 peak buses. The definition of annual scheduled vehicle hours and annual scheduled vehicle miles is consistent with the definitions used by SCRTD in preparing Section 15 Reports.

TABLE 1

UNIT COSTS FOR THE FY 1984 BUS OPERATING COST MODEL

ALLOCATION TO	BY	STEP BASIS	UNIT/STEP COST	MARG-INAL	LEVEL	SOURCE
Buses	Direct	1.0	$79.0111	Yes	System	Telecomm. Supplies
Buses	Fixed	1.0	$33,392.6321	No	System	Most HQ Departments
Buses	Step	5.6	$27,886	Yes	Div.	Maint.Oper.Div. Servicing
Buses	Step	32	$28,122	Yes	Div.	Mt.Op.Div. Serv. Deep Cln
Buses	Step	34.4	$39,335	Yes	Div.	Mt.Op.Div. Wheelchair Srv
Buses	Step	40.5	$30,095	Yes	System	Scheduling Checkers
Buses	Step	56	$39,495	Yes	System	Telecomm. Elect. Maint.
Buses	Step	60.7	$40,457	Yes	Div.	Mt.Op.Div. Camp.& Reser.
Buses	Step	121	$27,919	Yes	System	Central Maint. Service
Buses	Step	138	$70,238	Yes	System	Cent. Mnt. Cent.Shop Sup.
Buses	Step	147	$365,754	Yes	System	Fac. Maint. All Unfixed
Buses	Step	159	$490,488	Yes	Div.	Transp. Oper. Div.
Buses	Step	159	$44,085	Yes	System	Transp. Services All
Buses	Step	159	$88,402	Yes	Div.	Cont.& Purch. Storekeeper
Buses	Step	172	$693,087	Yes	Div.	Mt.Op.Div. Misc.,Supp.,Ad
Buses	Step	172	$261,210	Yes	Div.	Transp.Instr. Instructors
Buses	Step	188	$50,394	Yes	System	Maint. Gen. Instruction
Buses	Step	188	$42,739	Yes	Div.	Mt.Oper.Div. Serv. Super.
Buses	Step	206	$39,343	Yes	Div.	Mt.Op.Div. Farebox Maint.
Hours	Fixed	1.0	$0.2321	No	System	Transp. General -- All
Hours	Fixed	1.0	$0.3454	No	System	Transp. Services -- Wages
Hours	Fixed	1.0	$0.0168	No	System	Non-dep. Fuel/Lube,Nonrev
Hours	Step	777	$17,150	Yes	Div.	Transp.Op.Div. -- Oper.
Hours	Step	777	$919	Yes	Div.	Non-dep. Wkmn.Comp.,Oper.
Hours	Step	264,889	$39,296	Yes	System	Mt.Op.Div. Non-rev.Maint.
Hours	Step	420,706	$36,588	Yes	System	Police - Trans.Serv.Insp.
Hours	Step	447,000	$44,250	Yes	System	Trn.Instr. Oper. Training
Hours	Step	447,000	$28,313	Yes	System	Acc.& Fiscal - Payroll Cl
Hours	Step	476,800	$44,267	Yes	System	Transp.Serv. Strt Superv.
Hours	Step	596,000	$30,083	Yes	System	Scheduling Sched. Makers
Miles	Direct	1.0	$0.2814	Yes	System	Mnt.Op.Div. Parts,lube,..
Miles	Direct	1.0	$0.2915	Yes	System	Non-Dep. Fuel & Taxes

TABLE 1 (continued)

UNIT COSTS FOR THE FY 1984 BUS OPERATING COST MODEL

ALLOCATION TO	ALLOCATION BY	STEP BASIS	UNIT/STEP COST	MARGINAL	LEVEL	SOURCE
Miles	Step	39,364	$456	Yes	System	Non-dep. Exp. Exp.for PD
Miles	Step	39,364	$634	Yes	System	Non-dep. Exp. Prov.for PD
Miles	Step	59,451	$2,034	Yes	System	Non-dep. Wkmns Comp.Maint
Miles	Step	154,169	$39,321	Yes	Div.	Mt.Op.Div. Running Repair
Miles	Step	1,251,605	$39,316	Yes	Div.	Maint.Op.Div. Inspectors
Miles	Step	1,463,415	$39,323	Yes	System	Cent.Maint. Body & Frame
Miles	Step	2,320,049	$39,317	Yes	System	Cent.Maint. Paint & Trim
Miles	Step	2,439,026	$39,308	Yes	System	Cent.Maint. Engine Rebld
Miles	Step	2,972,563	$39,312	Yes	System	Cent. Maint. Electrical
Miles	Step	3,280,069	$39,344	Yes	System	Cent.Maint.Running Repair
Miles	Step	3,280,069	$39,344	Yes	System	Cent.Maint. Transmission
Miles	Step	3,523,037	$39,296	Yes	System	Cent. Maint. Small Units
Miles	Step	6,341,467	$39,266	Yes	System	Cent. Maint. Upholstery
Miles	Step	6,794,429	$39,286	Yes	System	Cent. Maint. Welding
Miles	Step	7,317,077	$39,308	Yes	System	Cent. Maint. Machine Shop
Miles	Step	7,926,833	$39,334	Yes	System	Cent. Maint. Sht.Metal Sh
Miles	Step	9,512,200	$39,400	Yes	System	Cent. Maint.Engine Teardn
Miles	Step	11,890,250	$39,250	Yes	System	Cent. Maint. Radiator
Miles	Step	31,707,333	$131,333	Yes	System	Cent. Maint. Misc. Repair
Passenger	Direct	1.0	$0.0011	Yes	System	Print Shop - Timetables
Passenger	Fixed	1.0	$0.0063	No	System	Marketing & Communication
Passenger	Fixed	1.0	$0.0025	No	System	Customer Rel. (Fixed)
Passenger	Step	101,174	$456	Yes	System	Expenses for PL
Passenger	Step	101,174	$4,916	Yes	System	Prov. for Uninsured PL
Passenger	Step	4,951,064	$28,106	Yes	System	Customer Rel. Tel. Clerks
Passenger	Step	13,688,235	$36,588	Yes	System	Transit Police Pass.Sec.
Passenger	Step	16,621,429	$29,322	Yes	System	Accounting Cash Clerks
Passenger	Step	21,154,545	$29,318	Yes	System	Mktg & Comm. Ticket Clerk

TABLE 2

UNIT COSTS FOR THE FY 1986 BUS OPERATING COST MODEL

ALLOCATION TO	ALLOCATION BY	STEP BASIS	UNIT/STEP COST	MARG-INAL	LEVEL	SOURCE
Buses	Direct	1.0	$75.4907	Yes	System	Fac.Maint. Supplies-Radio
Buses	Fixed	1.0	$43,640.6643	No	System	Most HQ Departments
Buses	Step	5.8	$31,945	Yes	Div.	Maint.Oper.Div. Servicing
Buses	Step	31.5	$42,645	Yes	System	Scheduling Checkers
Buses	Step	33	$31,771	Yes	Div.	Mt.Op.Div. Serv. Deep Cln
Buses	Step	33.1	$40,179	Yes	Div.	Mt.Op.Div. Wheelchair Srv
Buses	Step	47	$39,927	Yes	System	Fac. Maint. Elect. Maint.
Buses	Step	60.2	$40,173	Yes	Div.	Mt.Op.Div. Farebox Maint.
Buses	Step	110	$40,025	Yes	Div.	Mt.Op.Div. Spec. Project
Buses	Step	117	$32,032	Yes	System	Central Maint. Service
Buses	Step	142	$275,925	Yes	System	Fac.Maint.Elec.,Prop.,Sup
Buses	Step	142	$50,168	Yes	System	Maint. Gen. Instruction
Buses	Step	153	$750,139	Yes	Div.	Transp. Oper. Div.
Buses	Step	153	$44,121	Yes	System	Transp. Serv. Radio Disp.
Buses	Step	153	$96,867	Yes	Div.	Cont.& Purch. Storekeeper
Buses	Step	153	$729,656	Yes	Div.	Mt.Op.Div. Misc.,Supp.,Ad
Buses	Step	166	$47,954	Yes	System	Cent.Maint. Cent.Shop Sup
Hours	Fixed	1.0	$0.1696	No	System	Transp. General -- All
Hours	Fixed	1.0	$0.3326	No	System	Transp. Services -- Wages
Hours	Fixed	1.0	$0.0079	No	System	Non-dep. Fuel/Lube,Nonrev
Hours	Step	853	$19,383	Yes	Div.	Transp.Op.Div. -- Oper.
Hours	Step	853	$1,681	Yes	Div.	Non-dep. Wkmn.Comp.,Oper.
Hours	Step	216,714	$34,400	Yes	System	Mt.Op.Div. Non-rev.Maint.
Hours	Step	329,783	$42,044	Yes	System	Scheduling Sched. Makers
Hours	Step	421,400	$44,002	Yes	System	Transp.Serv. Strt Superv.
Hours	Step	446,176	$34,471	Yes	System	Police - Trans.Serv.Insp.
Hours	Step	474,000	$44,244	Yes	System	Trn.Instr. Oper. Training
Hours	Step	632,083	$31,084	Yes	System	Acc.& Fiscal - Payroll Cl
Miles	Direct	1.0	$0.2366	Yes	System	Mnt.Op.Div. Parts,lube,..
Miles	Direct	1.0	$0.2703	Yes	System	Non-Dep. Fuel & Taxes

TABLE 2 (continued)

UNIT COSTS FOR THE FY 1986 BUS OPERATING COST MODEL

ALLOCATION TO	ALLOCATION BY	STEP BASIS	UNIT/STEP COST	MARGINAL	LEVEL	SOURCE
Miles	Step	107,465	$524	Yes	System	Non-dep. Exp. Exp.for PD
Miles	Step	107,465	$2.531	Yes	System	Non-dep. Exp. Prov.for PD
Miles	Step	69,332	$3,710	Yes	System	Non-dep. Wkmns Comp.Maint
Miles	Step	178,810	$40,186	Yes	Div.	Mt.Op.Div. Running Repair
Miles	Step	2,149,300	$40,180	Yes	Div.	Maint.Op.Div. Inspectors
Miles	Step	2,755,513	$40,179	Yes	System	Cent.Maint.Running Repair
Miles	Step	2,904,459	$40,189	Yes	System	Cent.Maint. Mechanical
Miles	Step	3,160,735	$40,206	Yes	System	Cent. Maint. Electrical
Miles	Step	3,358,281	$40,187	Yes	System	Cent.Maint. Body Shop
Miles	Step	3,582,167	$40,200	Yes	System	Cent.Maint. Transmission
Miles	Step	3,960,185	$39,984	Yes	System	Cent.Maint. Engine Line
Miles	Step	4,477,708	$40,209	Yes	System	Cent. Maint. Welding
Miles	Step	5,656,053	$40,158	Yes	System	Cent. Maint. Cylinder Hd.
Miles	Step	5,656,053	$40,158	Yes	System	Cent.Maint. Paint Shop
Miles	Step	7,676,071	$40,215	Yes	System	Cent. Maint. Machine Shop
Miles	Step	7,676,071	$40,215	Yes	System	Cent. Maint. Sht.Metal Sh
Miles	Step	8,266,538	$40,231	Yes	System	Cent. Maint. Frame Shop
Miles	Step	8,266,538	$40,231	Yes	System	Cent. Maint. Upholstery
Miles	Step	9,769,545	$40,182	Yes	System	Cent. Maint. Systems
Miles	Step	13,433,125	$40,125	Yes	System	Cent.Maint. Engine Parts
Miles	Step	13,433,125	$40,125	Yes	System	Cent. Maint.Engine Teardn
Miles	Step	17,910,833	$40,166	Yes	Div.	Mnt.Oper.Dv.Road Failure
Miles	Step	21,493,000	$40,033	Yes	System	Cent. Maint. Sign Shop
Miles	Step	26,866,250	$40,250	Yes	System	Cent. Maint. Tool & Unit
Passenger	Direct	1.0	$0.0011	Yes	System	Print Shop - Timetables
Passenger	Fixed	1.0	$0.0070	No	System	Marketing & Communication
Passenger	Fixed	1.0	$0.0029	No	System	Customer Rel. (Fixed)
Passenger	Step	163,231	$524	Yes	System	Expenses for PL
Passenger	Step	163,231	$14,481	Yes	System	Prov. for Uninsured PL
Passenger	Step	4,715,555	$29,678	Yes	System	Customer Rel. Tel. Clerks
Passenger	Step	12,482,353	$34,470	Yes	System	Transit Police Pass.Sec.
Passenger	Step	12,860,606	$32,273	Yes	System	Accounting Cash Clerks
Passenger	Step	19,290,909	$30,955	Yes	System	Mktg & Comm. Ticket Clerk

3. USING THE UNIT COSTS TO COMPUTE ANNUAL OPERATING COSTS

3.1 CALCULATION PROCEDURE FOR LINE-BY-LINE COSTS

The following general procedure should be used to determine the costs of operation of a single line or group of lines within the District. The procedure is fairly complex because of the different ways in which costs must be accounted for. However, the attached worksheets are designed to simplify the procedure, as far as possible for manual application.

STEP 1. Initiate Sheet 1 for each line for which service is to be costed.

a. If weekday service is to be costed, complete column A.
b. If Saturday service is to be costed, complete column C.
c. If Sunday service is to be costed, complete column E.
d. Calculate corresponding annual statistics for hours, miles, passengers, and revenue for applicable columns (column B for weekday period, column D for Saturday, and column F for Sunday).
e. Split miles, hours, passengers, revenue, and buses ~~between divisions if the line~~ operates out of more than one division, and complete a separate sheet 1 for each division component.
f. Add weekday, Saturday, and Sunday annual figures, if multiple periods will be costed, and enter data in Annual Total column. NOTE: Annual Total for Peak Buses should be the same number as is entered in column A.

incorrect

STEP 2. PEAK BUSES: (Weekday service only)

a. Transfer peak buses (PB) from sheet 1 to sheet 2, entry G for each line or part line to be costed.
b. Calculate column I and Column K for each entry until step size exceeds value G. Note that the entries in column I are the integer result of the calculation only (without rounding), and that calculations continue only for steps where the value of G exceeds the value in column H.
c. Calculate sheet totals.

STEP 3. VEHICLE HOURS:

a. Start a sheet 3 for each day for which service is to be costed on the line, i.e. for weekday, Saturday, and Sunday.
b. Transfer AWVH, ASVH, and AXVH from sheet 1 to entry L on the correct sheet 3.
c. Calculate column N and column P for each entry until step size exceeds value L. As in Step 2, the entries in column N are the truncated integers from the division, and continue only until the step size in column M exceeds the value of L.
d. Calculate sheet totals.

STEP 4. VEHICLE MILES:

a. As for Step 3, start a sheet 4 for each day for which service is to be costed on the line.
b. Transfer AWVM, ASVM, and AXVM from sheet 1 to entry Q on the correct sheet 4.
c. Calculate column S and column U for each entry until step size exceeds value Q. Column S entries are again truncated integers, and continue until the value in column R exceeds the value of Q.
d. Calculate sheet totals.

STEP 5. PASSENGER BOARDINGS:

a. As for Step 4, start a sheet 5 for each day for which service is to be costed on the line.
b. Transfer AWP, ASP, and AXP from sheet 1 to entry V on the correct sheet 5.
c. Calculate column X and column Z for each entry until step size exceeds value V. Again, column X entries are truncated integers from the division of V by W, and continue only until the step size in column W exceeds the value of V.
d. Calculate sheet totals.

STEP 6. TOTAL PERIOD COSTS:

a. Start a sheet 6 for each line and period.
b. Enter totals from sheets 2, 3, 4, and 5 as shown on sheet 6 (Rows AA, BB, CC, and DD).
c. Sum for total cost for period for line; enter in TOTAL COSTS row (Row EE). This is the total cost for this line and period.
d. Enter total passenger revenue from Sheet 1 for the applicable period in the next row (Row FF).
e. Subtract passenger revenue (Row FF) from TOTAL COSTS (Row EE). This is the TOTAL NET COST for this line and period.

STEP 7. TOTAL LINE COSTS:

a. Repeat Steps 3, 4, and 5 for any service to be costed for more than one period (e.g., weekday and Saturday; weekday, Saturday, and Sunday; etc.) using the sum of the annual statistics for the appropriate periods, i.e., the Annual Totals column on Sheet 1. (Note that peak buses is a weekday only figure, and the same figure should be used for the annual total.)
b. Repeat Step 6 with the Sheets 1, 3, 4, and 5 prepared for service over all relevant periods, plus Sheet 2 from weekday service (if any). This is the total costs and total net costs for the line.

STEP 8. TOTAL DIVISION COSTS:

a. Start Sheet 1 for each division in which service changes are to be costed. Enter totals for all lines in the division on Sheet 1. (Use annual figures from individual lines, and leave daily columns blank.)
b. Start Sheets 2, 3, 4, and 5 for each division. Enter peak buses, total annual hours, total annual miles, and total annual passengers for all lines in the division in entries G, L, Q, and V.
c. Calculate values in columns I, N, S, and X for all entries until the step size exceeds the entries in G, L, Q, or V, as appropriate. Compute values in columns K, P, U, and Z.
d. Calculate totals of columns K, P, U, and Z and transfer to a Sheet 6 for the Division.
e. On Sheet 6, sum the four entries and enter in the TOTAL COSTS row. This is the total Division costs. Enter the total passenger revenue and subtract from TOTAL COSTS. This is the TOTAL NET COSTS for the Division.

NOTE: An internal check of computations should be made. The TOTAL COSTS and NET TOTAL COSTS figures obtained in this process should be at least as large as the sum of the individual lines calculated from Steps 1 through 7 (within the limits of rounding errors). They may be larger, but should never be smaller. If they are smaller, then checks should be made of the arithmetic used in compiling costs, because this result is indicative of an error.

STEP 9. TOTAL DISTRICT COSTS:

a. Repeat Step 8a and 8b, but for all divisions together.
b. On Sheets 2, 3, 4, and 5, calculate columns I, N, S, and X using entries in G, L, Q, and V only for "Step S" rows. Compute columns K, P, U, and Z for the same rows.
c. On Sheets 2, 3, 4, and 5, enter the sum over all divisions of the entries in columns K, P, U, and Z for rows labeled "Step D." DO NOT calculate these entries from the totals of buses, hours, miles, and passengers.
d. Calculate totals of columns K, P, U, and Z and transfer to a Sheet 6 for the District.
e. On Sheet 6 for the District, sum the four entries and enter in the TOTAL COSTS row. This is the total District costs. Enter the total passenger revenue and subtract from TOTAL COSTS. This is the TOTAL NET COSTS for the District.

NOTE: An internal check of computations should be made. The TOTAL COSTS and NET TOTAL COSTS figures obtained in this process should be at least as large as the sum of the individual divisions calculated from Steps 1 through 8 (within the limits of rounding errors). They may be larger, but should never be smaller. If they

are smaller, then checks should be made of the arithmetic used in compiling costs, because this result is indicative of an error.

FIGURE 1

COMPUTATION SHEETS FOR BUS OPERATING COST CALCULATIONS -- MARGINAL COSTS

DIVISION NO. _____ LINE NO. _____

SOURCE	WEEKDAY DAILY STATISTIC (A)	WEEKDAY ANNUAL STATISTIC B=(A)*255	SATURDAY DAILY STATISTIC (C)	SATURDAY ANNUAL STATISTIC D=(C)*52	SUNDAY DAILY STATISTIC (E)	SUNDAY ANNUAL STATISTIC F=(E)*58	ANNUAL TOTAL
Peak Buses	PB	-------	------	-------	-------	-------	
Vehicle Hours	WVH	AWVH	SVH	ASVH	XVH	AXVH	
Vehicle Miles	WVM	AWVM	SVM	ASVM	XVM	AXVM	
Pass. Boarding	WP	AWP	SP	ASP	XP	AXP	
Pass. Revenue	WPR	AWPR	SPR	ASPR	XPR	AXPR	

DIVISION NO. _____ LINE NO. _____

PEAK BUSES _____ (G) USE FOR WEEKDAY SERVICE ONLY
(enter number from Sheet 1) DO NOT USE FOR SATURDAY OR SUNDAY

TYPE	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J)	COMMENTS/SOURCE
Direct	1.0		75.4907		Facilities Maint. Radio Supplies
Step D	5.8		31,945		Maint. Oper. Div. Servicing
Step S	31.5		42,645		Scheduling Sched. Checkers
Step D	33		31,771		Maint. Oper. Div. Service Deep Clean
Step D	33.1		40,179		Maint. Oper. Div. Wheelchair Lift Ser
Step S	47		39,927		Facilities Maint. Electronics Maint.
Step D	60.2		40,173		Maint. Oper. Div. Farebox Maint.
Step D	110		40,025		Maint. Oper. Div. Special Projects
Step S	117		32,032		Central Maintenance Service
Step S	142		275,925		Facilities Maint. Elec.,Prop.,Supp.
Step S	142		50,168		Maintenance General Instruction
Step D	153		750,139		Transportation Oper. Division
Step S	153		44,121		Transportation Serv. Radio Dispatchers
Step D	153		729,656		Maint. Oper. Div. Misc., Supp., Admin
Step D	153		96,867		Contracts & Purch. Storekeepers
Step S	166		47,954		Central Maintenance Cent. Shop Superv.
TOTAL	-------	---------	-------		----------

FY 1986 COST BASIS SHEET 3 OF 6

DIVISION NO. _____ LINE NO. _____

VEHICLE HOURS _____ (L) WEEKDAY [ ]
(enter number from Sheet 1) SATURDAY [ ]
SUNDAY [ ]

TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (O)	ANNUAL COST (P= N*O)	COMMENTS/SOURCE
Step D	853		19,383		Transp.Oper.Div. Operators
Step D	853		1,681		Non-Departmental Exp Wkmn's Comp.-Oper.
Step S	216,714		34,400		Maint.Oper.Divisions Non-revenue Maint.
Step S	329,783		42,044		Scheduling Dept. Schedule Makers
Step S	421,400		44,002		Transportation Serv. Street Supervisors
Step S	446,176		34,471		Transit Police Transp. Serv. Insp.
Step S	474,000		44,244		Transportation Inst. Operator Training
Step S	632,083		31,084		Account. & Fiscal Payroll Clerks
TOTAL	-------	---------	-------		----------

DIVISION NO. _____ LINE NO. _____

VEHICLE MILES _____ (Q) WEEKDAY [ ]
(enter number from Sheet 1) SATURDAY [ ]
SUNDAY [ ]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0		0.2366		Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0		0.2703		Non-Departmental Exp Fuel and Taxes
Step S	69,332		3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465		3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810		40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300		40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513		40,179		Central Maintenance Running Repairs
Step S	2,904,459		40,189		Central Maintenance Mechanical
Step S	3,160,735		40,206		Central Maintenance Electrical
Step S	3,358,281		40,187		Central Maintenance Body Shop
Step S	3,582,167		40,200		Central Maintenance Transmission
Step S	3,960,185		39,984		Central Maintenance Engine Line
Step S	4,477,708		40,209		Central Maintenance Welding
Step S	5,656,053		80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071		80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538		80,462		Central Maintenance Frame Shp & Uphols.
TOTAL	-------	---------	-------		----------

DIVISION NO. _____ LINE NO. _____

VEHICLE MILES(cont.) _____ (Q) WEEKDAY [ ]
(enter number from Sheet 1) SATURDAY [ ]
SUNDAY [ ]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	-------	---------	-------		----------
Step S	9,769,545		40,182		Central Maintenance Systems
Step S	13,433,125		80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833		40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000		40,033		Central Maintenance Sign Shop
Step D	26,866,250		40,250		Central Maintenance Tool & Unit
TOTAL	-------	---------	-------		----------

FY 1986 COST BASIS SHEET 5 OF 6

DIVISION NO. _____ LINE NO. _____

PASSENGER BOARDINGS_____ (V) WEEKDAY [ ]
(enter number from Sheet 1) SATURDAY [ ]
SUNDAY [ ]

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0		0.0011		Print Shop Timetables
Step S	163,231		524		Non-Departmental Exp Expenses for PL
Step S	163,231		14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555		29,678		Customer Relations Telephone Clerks
Step S	12,482,353		34,470		Transit Police Passenger Security
Step S	12,860,606		32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909		30,955		Marketing & Commun. Ticket Clerks
TOTAL	-------	----------	-------		----------

FY 1986 COST BASIS

SHEET 6 OF 6

DIVISION NO. _____ LINE NO. _____

TOTAL LINE AND PERIOD COSTS PERIOD: WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [ ]

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	
TOTAL, Sheet 3, Column O - Hours (BB)	
TOTAL, Sheet 4, Column U - Miles (CC)	
TOTAL, Sheet 5, Column AA- Pass. (DD)	
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	
PASSENGER REVENUE - Sheet 1 (FF)	
TOTAL NET COSTS (EE-FF)	

3.2 EXAMPLES OF THE USE OF THE WORK SHEETS

The use of values from either Tables 1 or 2 in the worksheets is the same, apart from the values of unit costs and step sizes, and apart from the difference between revenue miles and hours and scheduled miles and hours. Therefore, the worksheets shown in the preceding section, based on FY 1986 values and on total miles and hours are used as the basis for example calculations. The principals and procedures are identical for either table.

3.2.1 Example 1 -- Cancellation of a Single Line

In the first example, consider the marginal costs associated with canceling a single line. The line to be cancelled is the line 203, with cancellation of weekday, Saturday, and Sunday service. Statistics for the line provide information for a typical weekday, Saturday, and Sunday, as follows:

Weekday:	P.M. Peak Buses	= 1
	Scheduled Hours	= 10.4
	Scheduled Miles	= 83.2
	Passenger Boardings	= 33
Saturday	Scheduled Hours	= 10.4
	Scheduled Miles	= 83.2
	Passenger Boardings	= 57
Sunday	Scheduled Hours	= 10.4
	Scheduled Miles	= 83.2
	Passenger Boardings	= 57

These values are entered in columns A, C, and E respectively of Sheet 1. (All worksheets for this example are provided in Appendix A.) Because the line operates on Tuesday through Sunday only, the factors to compile annual data from these statistics are 205 weekdays, 52 Saturdays, and 56 Sundays. (Memorial Day and Labor Day are always Mondays on which Sunday service is offered -- hence 50 Mondays are deducted from the weekdays and 2 from Sundays.) The multipliers are therefore adjusted on columns B, D, and F to reflect this. Annual statistics are calculated by multiplication of column A figures by 205, column C figures by 52, and column E figures by 56.

First, consider weekday marginal cost savings (meaning that fixed costs are not included). Sheet 2 for peak buses is shown for the weekday service, and indicates that only the directly-varying cost component provides a contribution to the cost of operating this line. The value of this is shown in column K as $75.49, which is also the total for sheet 2. Sheet 3 for vehicle hours is shown for weekday service, and shows total savings from vehicle hours of $42,128, based on 2,132 annual vehicle hours. These savings come entirely from savings in operators and workman's compensation paid for operators. Sheet 4 shows the weekday computations for vehicle miles, and indicates that the 17,056 annual vehicle miles costs $8,645.69, derived from parts, lube, fuel, taxes, etc. Sheet 5 for weekday service shows the costs attributable to the

6,765 annual passenger boardings, which total $7.44. These total costs are assembled on sheet 6 for weekday service, and show a total annual cost (Row EE) of $50,856.62, from which annual revenues of $2,460 should be subtracted for an estimate of $48,396.62 for the net annual cost of weekday service on line 203.

The same calculations can be made for each of Saturday and Sunday service and are shown on Sheets 3 through 6 for each of Saturday and Sunday. Sheet 6 for Saturday shows total annual costs of $2,196.11, and annual net costs of $996.11. Similarly, Sheet 6 for Sunday shows total annual costs of $2,365.16 and net annual costs of $1,065.16. Based on these three sheets, one might expect that total costs of all service on line 203 is the sum of the values on sheet 6 for the three periods, i.e. $48,396.62 + $996.11 + $1,065.16, or $50,457.89. However, the total line costs should be estimated from the totals of the vehicle hours, vehicle miles, and passenger boardings. This is shown on the next set of Sheets 3 through 6, which show a net annual cost of $71,521.88. This cost is higher than the sum of the three periods, because an additional step is triggered in vehicle hours when the total vehicle hours of all three periods are summed.

3.2.2 Example 2 -- Cancellation of 3 Lines from 2 Divisions

In this example, consider the cancellation of the following three lines:

1) Line 203 from Division 3 - all service
2) Line 225/226 from Division 18 - Saturday service only
3) Line 208 from Division 3 - Sunday service only

The calculations of savings for line 203 are as shown in Example 1, above. For lines 225/226 and 208, Appendix B provides the work sheets for Saturday service on lines 225/226 and Sunday service on line 208. Table 3 shows a summary of the statistics and costs for all three lines, costed individually.

Because lines 203 and 208 are both out of Division 3, it is necessary to determine whether additional cost savings will arise if both lines are cancelled. To do this, Step 8, as outlined in Section 3.1 is used. The results of this are shown on the work sheets in Appendix C. In this case, the sum of the individual line savings (from Table 3 and the work sheets for lines 203 and 208) are $96,500. Appendix C shows that the savings on the two lines counted from the Division are the same as the sum of the two lines, indicating that no additional savings from scale effects of combining the lines is achievable.

Finally, Step 9 should be followed to determine the total net savings to be obtained from cancellation of all of these lines together. The work sheets for this are shown in Appendix D. The addition of savings from the three lines taken individually amounts to $230,920. The work sheets in Appendix D show that a small amount of additional savings are obtained District-wide, with the total savings for cancellation of the three lines being $233,970. The additional savings are derived from the category of Non-Departmental Expenses, in the Provisions for and Expenses for PD insurance and claims.

In total, the potential net savings from canceling these three lines are approximately $234,000, representing the sum of the individual line savings and the District-wide savings. There are no additional division-level savings that are obtained from these cancellations.

TABLE 3

SERVICE STATISTICS AND COSTS FOR LINES 225/226, 208 AND 203

SOURCE	STATISTIC/COST 225/226	208	203
Boardings/day	638	146	33/57/57
Vehicle Hours/day	87.4	17.3	10.4
Vehicle Miles/day	1587.1	241.2	83.2
P.M. Peak Buses	7	1	1
Daily Revenue	$317	$47	$12/$23/$23
Annual Boardings	33,176	7,592	12,921
Annual Veh. Hrs.	4,545	900	3,255
Annual Veh. Mls.	82,529	12,542	26,041
P.M. Peak Buses	7	1	1
Annual Revenue	$16,484	$2,444	$4,960
Costs:			
Passenger Boardings	$36	$8	$14.21
Vehicle Hours	$105,320	$21,064	$63,192
Vehicle Miles	$45,544	$6,357	$13,200.18
Peak Buses	0	0	$75.49
Total Cost Savings	$150,900	$27,429	$76,481.88
Net Cost Savings by Line	$134,416	$24,982	$71,521.88

4. LIMITATIONS ON THE MODEL APPLICATION

4.1 IMPACTS OF CHANGING SERVICE LEVELS AND ORGANIZATION

The primary limitation on the use of the model for estimating costs is that the step costs and unit costs are based on the projection of labor and District organization that were provided in mid-1985 for the FY 1986 calibration. As a result, the model does not currently account for the closing of Division 2 and the consequent reduction in the total number of operating divisions. Also, if significant changes are proposed in service levels, the model should be recalibrated to adjust step sizes for all stepwise variables, and also adjust the unit costs in Tables 1 and 2 for the distribution of "fixed" costs. This recalibration takes into account the changes in the base over which the various costs are spread. If service levels are increased, the bases of peak buses, vehicle hours, vehicle miles, and passenger boardings are all likely to increase. If service levels are decreased, each of these bases are also likely to decrease. In the former case, unit costs of fixed budget items will decrease, and step sizes of stepwise variables will increase, until a reorganization of the District takes place. In the latter case, unit costs of fixed budget items will increase, and step sizes of stepwise variables will decrease, again, until a reorganization takes place. When service changes are small, these concerns are unlikely to have a significant effect on the estimation of costs, although subsequent sensitivity tests will be undertaken to determine the extent of these effects. It is clear that major system changes, on the order of ± 10 percent or more of current service will have significant effects on the accuracy of the estimated costs.

DIVISION NO. 18 LINE NO. 225/226

VEHICLE MILES 82,529 (Q) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [✓]
SUNDAY [ ]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	82,529	0.2366	$19,526	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	82,529	0.2703	$22,307	Non-Departmental Exp Fuel and Taxes
Step S	69,332	1	3,710	$3,710	Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	-	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	-	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	-	40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513	-	40,179		Central Maintenance Running Repairs
Step S	2,904,459	-	40,189		Central Maintenance Mechanical
Step S	3,160,735	-	40,206		Central Maintenance Electrical
Step S	3,358,281	-	40,187		Central Maintenance Body Shop
Step S	3,582,167	-	40,200		Central Maintenance Transmission
Step S	3,960,185	-	39,984		Central Maintenance Engine Line
Step S	4,477,708	-	40,209		Central Maintenance Welding
Step S	5,656,053	-	80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	-	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	-	80,462		Central Maintenance Frame Shp & Uphols.
TOTAL				$45,543	

DIVISION NO. 18 LINE NO. 225/226

VEHICLE MILES(cont.) 82,529 (Q) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [✓]
SUNDAY [ ]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	-------	-------	------	$45,543	----------
Step S	9,769,545	-	40,182		Central Maintenance Systems
Step S	13,433,125	-	80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833	-	40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000	-	40,033		Central Maintenance Sign Shop
Step D	26,866,250	-	40,250		Central Maintenance Tool & Unit
TOTAL	-------	-------	------	$45,543	----------

DIVISION NO. 18 LINE NO. 225/226

PASSENGER BOARDINGS 33,176 (V) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [✓]
SUNDAY [ ]

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	33,176	0.0011	$36.49	Print Shop Timetables
Step S	163,231	-	524		Non-Departmental Exp Expenses for PL
Step S	163,231	-	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	-	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	-	34,470		Transit Police Passenger Security
Step S	12,860,606	-	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	-	30,955		Marketing & Commun. Ticket Clerks
TOTAL				$36.49	

DIVISION NO. 18 LINE NO. 225/226

TOTAL LINE AND PERIOD COSTS PERIOD: WEEKDAY [ ] SATURDAY [✓] SUNDAY [ ]

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	—
TOTAL, Sheet 3, Column O - Hours (BB)	$105,320
TOTAL, Sheet 4, Column U - Miles (CC)	$45,543
TOTAL, Sheet 5, Column AA- Pass. (DD)	$36.49
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	$150,899.49
PASSENGER REVENUE - Sheet 1 (FF)	$16,484
TOTAL NET COSTS (EE-FF)	$134,415.49

APPENDIX C

WORK SHEETS FOR DIVISION 3

DIVISION NO. 3 LINE NO. (203 + 208)

SOURCE	WEEKDAY DAILY STATISTIC (A)	WEEKDAY ANNUAL STATISTIC B=(A)*255	SATURDAY DAILY STATISTIC (C)	SATURDAY ANNUAL STATISTIC D=(C)*52	SUNDAY DAILY STATISTIC (E)	SUNDAY ANNUAL STATISTIC F=(E)*58	ANNUAL TOTAL (B+D+F)
Peak Buses	1	-------	------	-------	------	-------	1
Vehicle Hours -		2,132		541		1,481	4,154
Vehicle Miles		17,056		4,326		17,201	38,583
Pass. Boarding		6,765		2,964		3,338	13,067
Pass. Revenue		$2,460		$1,196		$3,732	$7,388

DIVISION NO. 3 LINE NO. 203 & 208

PEAK BUSES 1 (G) USE FOR WEEKDAY SERVICE ONLY
(enter number from Sheet 1) DO NOT USE FOR SATURDAY OR SUNDAY

TYPE	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J)	COMMENTS/SOURCE
Direct	1.0	1	75.4907	$75.49	Facilities Maint. Radio Supplies
Step D	5.8	–	31,945		Maint. Oper. Div. Servicing
Step S	31.5	–	42,645		Scheduling Sched. Checkers
Step D	33	–	31,771		Maint. Oper. Div. Service Deep Clean
Step D	33.1	–	40,179		Maint. Oper. Div. Wheelchair Lift Ser
Step S	47	–	39,927		Facilities Maint. Electronics Maint.
Step D	60.2	–	40,173		Maint. Oper. Div. Farebox Maint.
Step D	110	–	40,025		Maint. Oper. Div. Special Projects
Step S	117	–	32,032		Central Maintenance Service
Step S	142	–	275,925		Facilities Maint. Elec.,Prop.,Supp.
Step S	142	–	50,168		Maintenance General Instruction
Step D	153	–	750,139		Transportation Oper. Division
Step S	153	–	44,121		Transportation Serv. Radio Dispatchers
Step D	153	–	729,656		Maint. Oper. Div. Misc., Supp., Admin
Step D	153	–	96,867		Contracts & Purch. Storekeepers
Step S	166	–	47,954		Central Maintenance Cent. Shop Superv.
TOTAL	-------	---------	-------	$75.49	----------

FY 1986 COST BASIS

DIVISION NO. 3

LINE NO. 203 & 208

VEHICLE HOURS 4,154 (L)
(enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (O)	ANNUAL COST (P= N*O)	COMMENTS/SOURCE
Step D	853	4	19,383	$77,532	Transp.Oper.Div. Operators
Step D	853	4	1,681	$6,724	Non-Departmental Exp Wkmn's Comp.-Oper.
Step S	216,714	-	34,400		Maint.Oper.Divisions Non-revenue Maint.
Step S	329,783	-	42,044		Scheduling Dept. Schedule Makers
Step S	421,400	-	44,002		Transportation Serv. Street Supervisors
Step S	446,176	-	34,471		Transit Police Transp. Serv. Insp.
Step S	474,000	-	44,244		Transportation Inst. Operator Training
Step S	632,083	-	31,084		Account. & Fiscal Payroll Clerks
TOTAL				$84,256	

DIVISION NO. _____ LINE NO. 285, 286

VEHICLE MILES 38,583 (Q) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	38,583	0.2366	$9,128	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	38,583	0.2703	$10,428	Non-Departmental Exp Fuel and Taxes
Step S	69,332	—	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	—	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	—	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	—	40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513	—	40,179		Central Maintenance Running Repairs
Step S	2,904,459	—	40,189		Central Maintenance Mechanical
Step S	3,160,735	—	40,206		Central Maintenance Electrical
Step S	3,358,281	—	40,187		Central Maintenance Body Shop
Step S	3,582,167	—	40,200		Central Maintenance Transmission
Step S	3,960,185	—	39,984		Central Maintenance Engine Line
Step S	4,477,708	—	40,209		Central Maintenance Welding
Step S	5,656,053	—	80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	—	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	—	80,462		Central Maintenance Frame Shp & Uphols.
TOTAL				$19,556	

DIVISION NO. 3 LINE NO. 203 & 208

VEHICLE MILES(cont.) 38,583 (Q) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	-------	----------	------	$19,556	----------
Step S	9,769,545	–	40,182		Central Maintenance Systems
Step S	13,433,125	–	80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833	–	40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000	–	40,033		Central Maintenance Sign Shop
Step D	26,866,250	–	40,250		Central Maintenance Tool & Unit
TOTAL	-------	----------	------	$19,556	----------

DIVISION NO. 3 LINE NO. 203 & 208

PASSENGER BOARDINGS 13,067 (V) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	13,067	0.0011	$14.37	Print Shop Timetables
Step S	163,231	-	524		Non-Departmental Exp Expenses for PL
Step S	163,231	-	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	-	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	-	34,470		Transit Police Passenger Security
Step S	12,860,606	-	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	-	30,955		Marketing & Commun. Ticket Clerks
TOTAL				$14.37	

FY 1986 COST BASIS

DIVISION NO. 3

LINE NO. 203 & 208

TOTAL LINE AND PERIOD COSTS

PERIOD: WEEKDAY [✓] SATURDAY [✓] SUNDAY [✓]

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	$75.49
TOTAL, Sheet 3, Column O - Hours (BB)	$84,256
TOTAL, Sheet 4, Column U - Miles (CC)	$19,556
TOTAL, Sheet 5, Column AA- Pass. (DD)	$14,37
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	$103,901.86
PASSENGER REVENUE - Sheet 1 (FF)	$ 7,388
TOTAL NET COSTS (EE-FF)	$96,513.86

APPENDIX D

WORK SHEETS FOR DISTRICT-WIDE COSTS/SAVINGS

DIVISION NO. SCRTD LINE NO. 203,208,225/226

SOURCE	WEEKDAY DAILY STATISTIC (A)	WEEKDAY ANNUAL STATISTIC B=(A)*255	SATURDAY DAILY STATISTIC (C)	SATURDAY ANNUAL STATISTIC D=(C)*52	SUNDAY DAILY STATISTIC (E)	SUNDAY ANNUAL STATISTIC F=(E)*58	ANNUAL TOTAL (B+D+F)
Peak Buses	1	-------	------	-------	-------	-------	1
Vehicle Hours		2,132		5,085		1,481	8,698
Vehicle Miles		17,056		86,855		17,201	121,112
Pass. Boarding		6,765		36,140		3,338	46,243
Pass. Revenue		$2,460		$17,680		$3,732	$23,872

DIVISION NO. SCRTD LINE NO. —

PEAK BUSES 1 (G) USE FOR WEEKDAY SERVICE ONLY
(enter number from Sheet 1) DO NOT USE FOR SATURDAY OR SUNDAY

TYPE	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J)	COMMENTS/SOURCE
Direct	1.0	1	75.4907	$75.49	Facilities Maint. Radio Supplies
Step D	5.8	—	31,945		Maint. Oper. Div. Servicing
Step S	31.5	—	42,645		Scheduling Sched. Checkers
Step D	33	—	31,771		Maint. Oper. Div. Service Deep Clean
Step D	33.1	—	40,179		Maint. Oper. Div. Wheelchair Lift Ser
Step S	47	—	39,927		Facilities Maint. Electronics Maint.
Step D	60.2	—	40,173		Maint. Oper. Div. Farebox Maint.
Step D	110	—	40,025		Maint. Oper. Div. Special Projects
Step S	117	—	32,032		Central Maintenance Service
Step S	142	—	275,925		Facilities Maint. Elec.,Prop.,Supp.
Step S	142	—	50,168		Maintenance General Instruction
Step D	153	—	750,139		Transportation Oper. Division
Step S	153	—	44,121		Transportation Serv. Radio Dispatchers
Step D	153	—	729,656		Maint. Oper. Div. Misc., Supp., Admin
Step D	153	—	96,867		Contracts & Purch. Storekeepers
Step S	166	—	47,954		Central Maintenance Cent. Shop Superv.
TOTAL	-------	--------	------	$75.49	----------

FY 1986 COST BASIS SHEET 3 OF 6

DIVISION NO. SCRTD LINE NO. —

VEHICLE HOURS 8,698 (L) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [ ]

TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (O)	ANNUAL COST (P= N*O)	COMMENTS/SOURCE
Step D	853	4+5 = 9	19,383	$174,447	Transp.Oper.Div. Operators
Step D	853	4+5 = 9	1,681	$15,129	Non-Departmental Exp Wkmn's Comp.-Oper.
Step S	216,714	—	34,400		Maint.Oper.Divisions Non-revenue Maint.
Step S	329,783	—	42,044		Scheduling Dept. Schedule Makers
Step S	421,400	—	44,002		Transportation Serv. Street Supervisors
Step S	446,176	—	34,471		Transit Police Transp. Serv. Insp.
Step S	474,000	—	44,244		Transportation Inst. Operator Training
Step S	632,083	—	31,084		Account. & Fiscal Payroll Clerks
TOTAL	-------	----------	-------	$189,576	----------

DIVISION NO. SCRTD LINE NO. ✓

VEHICLE MILES 121,112 (Q) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	121,112	0.2366	$28,655.10	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	121,112	0.2703	$32,736.57	Non-Departmental Exp Fuel and Taxes
Step S	69,332	1	3,710	$3,710	Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	1	3,055	$3,055	Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	—	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	—	40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513	—	40,179		Central Maintenance Running Repairs
Step S	2,904,459	—	40,189		Central Maintenance Mechanical
Step S	3,160,735	—	40,206		Central Maintenance Electrical
Step S	3,358,281	—	40,187		Central Maintenance Body Shop
Step S	3,582,167	—	40,200		Central Maintenance Transmission
Step S	3,960,185	—	39,984		Central Maintenance Engine Line
Step S	4,477,708	—	40,209		Central Maintenance Welding
Step S	5,656,053	—	80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	—	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	—	80,462		Central Maintenance Frame Shp & Uphols.
TOTAL				$68,156.67	

DIVISION NO. SCRTD LINE NO. /

VEHICLE MILES(cont.) 121,112 (Q) (enter number from Sheet 1)
WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	-------	-------	------	$68,156.67	----------
Step S	9,769,545	—	40,182		Central Maintenance Systems
Step S	13,433,125	—	80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833	—	40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000	—	40,033		Central Maintenance Sign Shop
Step D	26,866,250	—	40,250		Central Maintenance Tool & Unit
TOTAL	-------	-------	------	$68,156.67	----------

FY 1986 COST BASIS

DIVISION NO. SCRTD LINE NO. —

PASSENGER BOARDINGS 46,243 (V) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	46,243	0.0011	$50.87	Print Shop Timetables
Step S	163,231	–	524		Non-Departmental Exp Expenses for PL
Step S	163,231	–	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	–	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	–	34,470		Transit Police Passenger Security
Step S	12,860,606	–	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	–	30,955		Marketing & Commun. Ticket Clerks
TOTAL	-------	-------	-------	$50.87	-------

FY 1986 COST BASIS

DIVISION NO. SCRTD

LINE NO. 203, 208, 225/226

TOTAL LINE AND PERIOD COSTS

PERIOD: WEEKDAY [✓] SATURDAY [✓] SUNDAY [✓]

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	$75.49
TOTAL, Sheet 3, Column O - Hours (BB)	$189,576
TOTAL, Sheet 4, Column U - Miles (CC)	$68,156.67
TOTAL, Sheet 5, Column AA - Pass. (DD)	$50.87
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	$257,859.03
PASSENGER REVENUE - Sheet 1 (FF)	$23,872
TOTAL NET COSTS (EE-FF)	$233,987.03

APPENDIX A

WORK SHEETS FOR LINE 203

DIVISION NO. 3 LINE NO. 203

SOURCE	WEEKDAY DAILY STATISTIC (A)	WEEKDAY ANNUAL STATISTIC B=(A)*~~255~~ 205	SATURDAY DAILY STATISTIC (C)	SATURDAY ANNUAL STATISTIC D=(C)*52	SUNDAY DAILY STATISTIC (E)	SUNDAY ANNUAL STATISTIC F=(E)*~~58~~ 56	ANNUAL TOTAL (B+D+F)
Peak Buses	1	-------	------	-------	------	-------	1
Vehicle Hours	10.4	2,132	10.4	541	10.4	582	3,255
Vehicle Miles	83.2	17,056	83.2	4,326	83.2	4,659	26,041
Pass. Boarding	33	6,765	57	2,964	57	3,192	12,921
Pass. Revenue	$12	$2,460	$23	$1,196	$23	$1,288	$4,944

DIVISION NO. 3 LINE NO. 203

PEAK BUSES 1 (G) USE FOR WEEKDAY SERVICE ONLY
(enter number from Sheet 1) DO NOT USE FOR SATURDAY OR SUNDAY

TYPE	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J)	COMMENTS/SOURCE
Direct	1.0	1	75.4907	$75.49	Facilities Maint. Radio Supplies
Step D	5.8	—	31,945		Maint. Oper. Div. Servicing
Step S	31.5	—	42,645		Scheduling Sched. Checkers
Step D	33	—	31,771		Maint. Oper. Div. Service Deep Clean
Step D	33.1	—	40,179		Maint. Oper. Div. Wheelchair Lift Ser
Step S	47	—	39,927		Facilities Maint. Electronics Maint.
Step D	60.2	—	40,173		Maint. Oper. Div. Farebox Maint.
Step D	110	—	40,025		Maint. Oper. Div. Special Projects
Step S	117	—	32,032		Central Maintenance Service
Step S	142	—	275,925		Facilities Maint. Elec.,Prop.,Supp.
Step S	142	—	50,168		Maintenance General Instruction
Step D	153	—	750,139		Transportation Oper. Division
Step S	153	—	44,121		Transportation Serv. Radio Dispatchers
Step D	153	—	729,656		Maint. Oper. Div. Misc., Supp., Admin
Step D	153	—	96,867		Contracts & Purch. Storekeepers
Step S	166	—	47,954		Central Maintenance Cent. Shop Superv.
TOTAL	-------	-------	-------	$75.49	-------

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

VEHICLE HOURS 2,132 (L) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [ ]
SUNDAY [ ]

TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (O)	ANNUAL COST (P= N*O)	COMMENTS/SOURCE
Step D	853	2	19,383	$38,766	Transp.Oper.Div. Operators
Step D	853	2	1,681	$3,362	Non-Departmental Exp Wkmn's Comp.-Oper.
Step S	216,714	-	34,400		Maint.Oper.Divisions Non-revenue Maint.
Step S	329,783	-	42,044		Scheduling Dept. Schedule Makers
Step S	421,400	-	44,002		Transportation Serv. Street Supervisors
Step S	446,176	-	34,471		Transit Police Transp. Serv. Insp.
Step S	474,000	-	44,244		Transportation Inst. Operator Training
Step S	632,083	-	31,084		Account. & Fiscal Payroll Clerks
TOTAL	-------	---------	-------	$42,128	----------

DIVISION NO. 3 LINE NO. 203

VEHICLE MILES 17,056 (Q) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [ ]
SUNDAY [ ]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	17,056	0.2366	$4,035.45	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	17,056	0.2703	$4,610.24	Non-Departmental Exp Fuel and Taxes
Step S	69,332	-	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	-	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	-	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	-	40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513	-	40,179		Central Maintenance Running Repairs
Step S	2,904,459	-	40,189		Central Maintenance Mechanical
Step S	3,160,735	-	40,206		Central Maintenance Electrical
Step S	3,358,281	-	40,187		Central Maintenance Body Shop
Step S	3,582,167	-	40,200		Central Maintenance Transmission
Step S	3,960,185	-	39,984		Central Maintenance Engine Line
Step S	4,477,708	-	40,209		Central Maintenance Welding
Step S	5,656,053	-	80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	-	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	-	80,462		Central Maintenance Frame Shp & Uphols.
TOTAL	------	------	------	$8,645.69	------

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

VEHICLE MILES(cont.) 17,056 (Q) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [ ]
SUNDAY [ ]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.				$8,645.69	
Step S	9,769,545	-	40,182		Central Maintenance Systems
Step S	13,433,125	-	80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833	-	40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000	-	40,033		Central Maintenance Sign Shop
Step D	26,866,250	-	40,250		Central Maintenance Tool & Unit
TOTAL				$8,645.69	

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

PASSENGER BOARDINGS 6,765 (V) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [ ]
SUNDAY [ ]

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	6,765	0.0011	$7.44	Print Shop Timetables
Step S	163,231	-	524		Non-Departmental Exp Expenses for PL
Step S	163,231	-	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	-	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	-	34,470		Transit Police Passenger Security
Step S	12,860,606	-	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	-	30,955		Marketing & Commun. Ticket Clerks
TOTAL				$7.44	

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

TOTAL LINE AND PERIOD COSTS PERIOD: WEEKDAY [✓]
SATURDAY [ ]
SUNDAY [ ]

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	$75.49
TOTAL, Sheet 3, Column O - Hours (BB)	$42,128.00
TOTAL, Sheet 4, Column U - Miles (CC)	$8,645.69
TOTAL, Sheet 5, Column AA- Pass. (DD)	$7.44
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	$50,856.62
PASSENGER REVENUE - Sheet 1 (FF)	$2,460
TOTAL NET COSTS (EE-FF)	$48,396.62

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

VEHICLE HOURS 541 (L) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [✓]
SUNDAY [ ]

TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (O)	ANNUAL COST (P= N*O)	COMMENTS/SOURCE
Step D	853	-	19,383	0	Transp.Oper.Div. Operators
Step D	853	-	1,681		Non-Departmental Exp Wkmn's Comp.-Oper.
Step S	216,714	-	34,400		Maint.Oper.Divisions Non-revenue Maint.
Step S	329,783	-	42,044		Scheduling Dept. Schedule Makers
Step S	421,400	-	44,002		Transportation Serv. Street Supervisors
Step S	446,176	-	34,471		Transit Police Transp. Serv. Insp.
Step S	474,000	-	44,244		Transportation Inst. Operator Training
Step S	632,083	-	31,084		Account. & Fiscal Payroll Clerks
TOTAL	------	--------	------	$0.00	----------

DIVISION NO. 3 LINE NO. 203

VEHICLE MILES 4,326 (Q) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [✓]
SUNDAY [ ]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	4,326	0.2366	$1,023.53	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	4,326	0.2703	$1,169.32	Non-Departmental Exp Fuel and Taxes
Step S	69,332	-	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	-	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	-	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	-	40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513	-	40,179		Central Maintenance Running Repairs
Step S	2,904,459	-	40,189		Central Maintenance Mechanical
Step S	3,160,735	-	40,206		Central Maintenance Electrical
Step S	3,358,281	-	40,187		Central Maintenance Body Shop
Step S	3,582,167	-	40,200		Central Maintenance Transmission
Step S	3,960,185	-	39,984		Central Maintenance Engine Line
Step S	4,477,708	-	40,209		Central Maintenance Welding
Step S	5,656,053	-	80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	-	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	-	80,462		Central Maintenance Frame Shp & Uphols.
TOTAL				$2,192.85	

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

VEHICLE MILES(cont.) 4,326 (Q) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [✓]
SUNDAY [ ]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	------	-------	------	$2,192.85	----------
Step S	9,769,545	-	40,182		Central Maintenance Systems
Step S	13,433,125	-	80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833	-	40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000	-	40,033		Central Maintenance Sign Shop
Step D	26,866,250	-	40,250		Central Maintenance Tool & Unit
TOTAL	------	-------	------	$2,192.85	----------

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

PASSENGER BOARDINGS 2,964 (V) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [✓]
SUNDAY [ ]

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	2,964	0.0011	$3.26	Print Shop Timetables
Step S	163,231	-	524		Non-Departmental Exp Expenses for PL
Step S	163,231	-	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	-	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	-	34,470		Transit Police Passenger Security
Step S	12,860,606	-	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	-	30,955		Marketing & Commun. Ticket Clerks
TOTAL				$3.26	

DIVISION NO. 3 LINE NO. 203

TOTAL LINE AND PERIOD COSTS PERIOD: WEEKDAY [ ] SATURDAY [✓] SUNDAY [ ]

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	—
TOTAL, Sheet 3, Column O - Hours (BB)	0
TOTAL, Sheet 4, Column U - Miles (CC)	$2,192.85
TOTAL, Sheet 5, Column AA- Pass. (DD)	$3.26
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	$2,196.11
PASSENGER REVENUE - Sheet 1 (FF)	$1,196
TOTAL NET COSTS (EE-FF)	$1,000.11

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

VEHICLE HOURS 582 (L) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [✓]

TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (O)	ANNUAL COST (P= N*O)	COMMENTS/SOURCE
Step D	853	–	19,383	0	Transp.Oper.Div. Operators
Step D	853	–	1,681		Non-Departmental Exp Wkmn's Comp.-Oper.
Step S	216,714	–	34,400		Maint.Oper.Divisions Non-revenue Maint.
Step S	329,783	–	42,044		Scheduling Dept. Schedule Makers
Step S	421,400	–	44,002		Transportation Serv. Street Supervisors
Step S	446,176	–	34,471		Transit Police Transp. Serv. Insp.
Step S	474,000	–	44,244		Transportation Inst. Operator Training
Step S	632,083	–	31,084		Account. & Fiscal Payroll Clerks
TOTAL	------	--------	------	$0.00	----------

DIVISION NO. 3 LINE NO. 203

VEHICLE MILES 4,659 (Q) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	4,659	0.2366	$1,102.32	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	4,659	0.2703	$1,259.33	Non-Departmental Exp Fuel and Taxes
Step S	69,332	—	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	—	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	—	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	—	40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513	—	40,179		Central Maintenance Running Repairs
Step S	2,904,459	—	40,189		Central Maintenance Mechanical
Step S	3,160,735	—	40,206		Central Maintenance Electrical
Step S	3,358,281	—	40,187		Central Maintenance Body Shop
Step S	3,582,167	—	40,200		Central Maintenance Transmission
Step S	3,960,185	—	39,984		Central Maintenance Engine Line
Step S	4,477,708	—	40,209		Central Maintenance Welding
Step S	5,656,053	—	80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	—	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	—	80,462		Central Maintenance Frame Shp & Uphols.
TOTAL	------	------	------	$2,361.65	------

DIVISION NO. 3 LINE NO. 203

VEHICLE MILES(cont.) 4,659 (Q) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	------	-------	------	$2,361.65	----------
Step S	9,769,545	-	40,182		Central Maintenance Systems
Step S	13,433,125	-	80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833	-	40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000	-	40,033		Central Maintenance Sign Shop
Step D	26,866,250	-	40,250		Central Maintenance Tool & Unit
TOTAL	------	-------	------	$2,361.65	----------

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

PASSENGER BOARDINGS 3,192 (V) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [✓]

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	3,192	0.0011	$3.51	Print Shop Timetables
Step S	163,231	–	524		Non-Departmental Exp Expenses for PL
Step S	163,231	–	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	–	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	–	34,470		Transit Police Passenger Security
Step S	12,860,606	–	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	–	30,955		Marketing & Commun. Ticket Clerks
TOTAL	------	------	------	$3.51	------

DIVISION NO. 3 LINE NO. 203

TOTAL LINE AND PERIOD COSTS PERIOD: WEEKDAY [ ] SATURDAY [ ] SUNDAY [✓]

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	-
TOTAL, Sheet 3, Column O - Hours (BB)	$0
TOTAL, Sheet 4, Column U - Miles (CC)	$2,361.65
TOTAL, Sheet 5, Column AA- Pass. (DD)	$3.51
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	$2,365.16
PASSENGER REVENUE - Sheet 1 (FF)	$1,288
TOTAL NET COSTS (EE-FF)	$1,077.16

DIVISION NO. 3 LINE NO. 203

VEHICLE HOURS 3,255 (L) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (O)	ANNUAL COST (P= N*O)	COMMENTS/SOURCE
Step D	853	3	19,383	$58,149	Transp.Oper.Div. Operators
Step D	853	3	1,681	$5,043	Non-Departmental Exp Wkmn's Comp.-Oper.
Step S	216,714	–	34,400		Maint.Oper.Divisions Non-revenue Maint.
Step S	329,783	–	42,044		Scheduling Dept. Schedule Makers
Step S	421,400	–	44,002		Transportation Serv. Street Supervisors
Step S	446,176	–	34,471		Transit Police Transp. Serv. Insp.
Step S	474,000	–	44,244		Transportation Inst. Operator Training
Step S	632,083	–	31,084		Account. & Fiscal Payroll Clerks
TOTAL				$63,192	

DIVISION NO. 3 LINE NO. 203

VEHICLE MILES 26,041 (Q) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	26,041	0.2366	$6,161.30	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	26,041	0.2703	$7,038.88	Non-Departmental Exp Fuel and Taxes
Step S	69,332	-	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	-	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	-	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	-	40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513	-	40,179		Central Maintenance Running Repairs
Step S	2,904,459	-	40,189		Central Maintenance Mechanical
Step S	3,160,735	-	40,206		Central Maintenance Electrical
Step S	3,358,281	-	40,187		Central Maintenance Body Shop
Step S	3,582,167	-	40,200		Central Maintenance Transmission
Step S	3,960,185	-	39,984		Central Maintenance Engine Line
Step S	4,477,708	-	40,209		Central Maintenance Welding
Step S	5,656,053	-	80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	-	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	-	80,462		Central Maintenance Frame Shp & Uphols.
TOTAL	------	------	------	$13,200.18	------

1986 COST BASIS

DIVISION NO. 3 LINE NO. 203

VEHICLE MILES(cont.) 26,041 (Q) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	-------	---------	-------	$13,200.18	----------
Step S	9,769,545	—	40,182		Central Maintenance Systems
Step S	13,433,125	—	80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833	—	40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000	—	40,033		Central Maintenance Sign Shop
Step D	26,866,250	—	40,250		Central Maintenance Tool & Unit
TOTAL	-------	---------	-------	$13,200.18	----------

DIVISION NO. 3 LINE NO. 203

PASSENGER BOARDINGS 12,921 (V) (enter number from Sheet 1)

WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	12,921	0.0011	$14.21	Print Shop Timetables
Step S	163,231	—	524		Non-Departmental Exp Expenses for PL
Step S	163,231	—	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	—	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	—	34,470		Transit Police Passenger Security
Step S	12,860,606	—	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	—	30,955		Marketing & Commun. Ticket Clerks
TOTAL	------	------	------	$14.21	------

1986 COST BASIS

DIVISION NO. 3

LINE NO. 203

TOTAL LINE AND PERIOD COSTS

PERIOD: WEEKDAY [✓]
SATURDAY [✓]
SUNDAY [✓]

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	$75.49
TOTAL, Sheet 3, Column O - Hours (BB)	$63,192
TOTAL, Sheet 4, Column U - Miles (CC)	$13,200.18
TOTAL, Sheet 5, Column AA- Pass. (DD)	$14.21
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	$76,481.88
PASSENGER REVENUE - Sheet 1 (FF)	$4,944
TOTAL NET COSTS (EE-FF)	$71,537.88

APPENDIX B

WORK SHEETS FOR LINES 208 AND 225/226

DIVISION NO. 3 LINE NO. 208

SOURCE	WEEKDAY DAILY STATISTIC (A)	WEEKDAY ANNUAL STATISTIC B=(A)*255	SATURDAY DAILY STATISTIC (C)	SATURDAY ANNUAL STATISTIC D=(C)*52	SUNDAY DAILY STATISTIC (E)	SUNDAY ANNUAL STATISTIC F=(E)*~~58~~ 52	ANNUAL TOTAL (B+D+F)
Peak Buses		-------	------	-------	------	------	
Vehicle Hours					17.3	899	
Vehicle Miles					241.2	12,542	
Pass. Boarding					146	7,592	
Pass. Revenue					$47	2,444	

DIVISION NO. 3 LINE NO. 208

PEAK BUSES SUNDAY — NOT USED (G) USE FOR WEEKDAY SERVICE ONLY
(enter number from Sheet 1) DO NOT USE FOR SATURDAY OR SUNDAY

TYPE	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J)	COMMENTS/SOURCE
Direct	1.0		75.4907		Facilities Maint. Radio Supplies
Step D	5.8		31,945		Maint. Oper. Div. Servicing
Step S	31.5		42,645		Scheduling Sched. Checkers
Step D	33		31,771		Maint. Oper. Div. Service Deep Clean
Step D	33.1		40,179		Maint. Oper. Div. Wheelchair Lift Ser
Step S	47		39,927		Facilities Maint. Electronics Maint.
Step D	60.2		40,173		Maint. Oper. Div. Farebox Maint.
Step D	110		40,025		Maint. Oper. Div. Special Projects
Step S	117		32,032		Central Maintenance Service
Step S	142		275,925		Facilities Maint. Elec.,Prop.,Supp.
Step S	142		50,168		Maintenance General Instruction
Step O	153		750,139		Transportation Oper. Division
Step S	153		44,121		Transportation Serv. Radio Dispatchers
Step D	153		729,656		Maint. Oper. Div. Misc., Supp., Admin
Step D	153		96,867		Contracts & Purch. Storekeepers
Step S	166		47,954		Central Maintenance Cent. Shop Superv.
TOTAL	-------	---------	-------	0	----------

DIVISION NO. 3 LINE NO. 208

VEHICLE MILES 12,542 (Q) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	12,542	0.2366	$2,967	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	12,542	0.2703	$3,390	Non-Departmental Exp Fuel and Taxes
Step S	69,332	–	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	–	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	–	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	–	40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513	–	40,179		Central Maintenance Running Repairs
Step S	2,904,459	–	40,189		Central Maintenance Mechanical
Step S	3,160,735	–	40,206		Central Maintenance Electrical
Step S	3,358,281	–	40,187		Central Maintenance Body Shop
Step S	3,582,167	–	40,200		Central Maintenance Transmission
Step S	3,960,185	–	39,984		Central Maintenance Engine Line
Step S	4,477,708	–	40,209		Central Maintenance Welding
Step S	5,656,053	–	80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	–	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	–	80,462		Central Maintenance Frame Shp & Uphols.
TOTAL				$6,357	

DIVISION NO. 3 LINE NO. 208

VEHICLE MILES 12,542 (Q) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	12,542	0.2366	$2,967	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	12,542	0.2703	$3,390	Non-Departmental Exp Fuel and Taxes
Step S	69,332	-	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	-	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	-	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	-	40,180		Maint. Oper. Div. Inspectors
Step S	2,755,513	-	40,179		Central Maintenance Running Repairs
Step S	2,904,459	-	40,189		Central Maintenance Mechanical
Step S	3,160,735	-	40,206		Central Maintenance Electrical
Step S	3,358,281	-	40,187		Central Maintenance Body Shop
Step S	3,582,167	-	40,200		Central Maintenance Transmission
Step S	3,960,185	-	39,984		Central Maintenance Engine Line
Step S	4,477,708	-	40,209		Central Maintenance Welding
Step S	5,656,053	-	80,316		Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	-	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	-	80,462		Central Maintenance Frame Shp & Uphols.
TOTAL	-------	-------	------	$6,357	-------

DIVISION NO. 3 LINE NO. 208

VEHICLE MILES(cont.) 12,542 (Q) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [✓]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	-------	-------	------	$6,357	----------
Step S	9,769,545	—	40,182		Central Maintenance Systems
Step S	13,433,125	—	80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833	—	40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000	—	40,033		Central Maintenance Sign Shop
Step D	26,866,250	—	40,250		Central Maintenance Tool & Unit
TOTAL	-------	-------	------	$6,357	----------

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 208

PASSENGER BOARDINGS 7,592 (V) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [✓]

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	7,592	0.0011	$8.35	Print Shop Timetables
Step S	163,231	-	524		Non-Departmental Exp Expenses for PL
Step S	163,231	-	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	-	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	-	34,470		Transit Police Passenger Security
Step S	12,860,606	-	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	-	30,955		Marketing & Commun. Ticket Clerks
TOTAL	------	------	------	$8.35	------

FY 1986 COST BASIS

DIVISION NO. 3

LINE NO. 208

TOTAL LINE AND PERIOD COSTS

PERIOD: WEEKDAY [ ]
SATURDAY [ ]
SUNDAY [✓]

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	-
TOTAL, Sheet 3, Column O - Hours (BB)	$21,064
TOTAL, Sheet 4, Column U - Miles (CC)	$ 6,357
TOTAL, Sheet 5, Column AA - Pass. (DD)	$ 8.35
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	$27, 429.35
PASSENGER REVENUE - Sheet 1 (FF)	$ 2,444
TOTAL NET COSTS (EE-FF)	$24,982.35

DIVISION NO. 18 LINE NO. 225/226

SOURCE	WEEKDAY DAILY STATISTIC (A)	WEEKDAY ANNUAL STATISTIC B=(A)*255	SATURDAY DAILY STATISTIC (C)	SATURDAY ANNUAL STATISTIC D=(C)*52	SUNDAY DAILY STATISTIC (E)	SUNDAY ANNUAL STATISTIC F=(E)*58	ANNUAL TOTAL (B+D+F)
Peak Buses		-------	------	-------	-------	-------	
Vehicle Hours			87.4	4,544			
Vehicle Miles			1,587.1	82,529			
Pass. Boarding			638	33,176			
Pass. Revenue			$317	$16,484			

DIVISION NO. 18 LINE NO. 225/226

PEAK BUSES NOT USED - SATURDAY (G) USE FOR WEEKDAY SERVICE ONLY
(enter number from Sheet 1) DO NOT USE FOR SATURDAY OR SUNDAY

TYPE	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J)	COMMENTS/SOURCE
Direct	1.0		75.4907	0	Facilities Maint. Radio Supplies
Step D	5.8		31,945		Maint. Oper. Div. Servicing
Step S	31.5		42,645		Scheduling Sched. Checkers
Step D	33		31,771		Maint. Oper. Div. Service Deep Clean
Step D	33.1		40,179		Maint. Oper. Div. Wheelchair Lift Ser
Step S	47		39,927		Facilities Maint. Electronics Maint.
Step D	60.2		40,173		Maint. Oper. Div. Farebox Maint.
Step D	110		40,025		Maint. Oper. Div. Special Projects
Step S	117		32,032		Central Maintenance Service
Step S	142		275,925		Facilities Maint. Elec.,Prop.,Supp.
Step S	142		50,168		Maintenance General Instruction
Step D	153		750,139		Transportation Oper. Division
Step S	153		44,121		Transportation Serv. Radio Dispatchers
Step D	153		729,656		Maint. Oper. Div. Misc., Supp., Admin
Step D	153		96,867		Contracts & Purch. Storekeepers
Step S	166		47,954		Central Maintenance Cent. Shop Superv.
TOTAL	-------	----------	-------	0	----------

FY 1986 COST BASIS

DIVISION NO. 18 LINE NO. 225/226

VEHICLE HOURS 4,544 (L) (enter number from Sheet 1)

WEEKDAY [ ]
SATURDAY [✓]
SUNDAY [ ]

TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (O)	ANNUAL COST (P= N*O)	COMMENTS/SOURCE
Step D	853	5	19,383	$96,915	Transp.Oper.Div. Operators
Step D	853	5	1,681	$8,405	Non-Departmental Exp Wkmn's Comp.-Oper.
Step S	216,714	–	34,400		Maint.Oper.Divisions Non-revenue Maint.
Step S	329,783	–	42,044		Scheduling Dept. Schedule Makers
Step S	421,400	–	44,002		Transportation Serv. Street Supervisors
Step S	446,176	–	34,471		Transit Police Transp. Serv. Insp.
Step S	474,000	–	44,244		Transportation Inst. Operator Training
Step S	632,083	–	31,084		Account. & Fiscal Payroll Clerks
TOTAL	-------	----------	-------	$105,320	----------

GENERAL PLANNING CONSULTANT:

TECHNICAL MEMORANDUM 86.5.1

FY 86 CALIBRATION OF THE BUS OPERATING COST MODEL

Prepared for:

Southern California Rapid Transit District

Prepared by:

Schimpeler Corradino Associates

in association with

Barton-Aschman Associates, Inc.
Cordoba Corporation
Myra L. Frank & Associates
Manuel Padron
The Planning Group, Inc.

November, 1985
(Revised, January 1986)

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1. INTRODUCTION

1.1 BACKGROUND

Technical Memorandum 5.1.2 (June 1984) described the original specification of an SCRTD bus operating cost model. The purpose of this additional report is to document an update of the June, 1984 calibration of the model to FY 1986. This Technical Memorandum provides the detailed allocation of costs by category, as discussed below, and also describes those items that represent significant departures from the original FY 1984 calibration.

This bus operating cost model is designed to allow the District to compute the operating expenses for bus operation associated with either increases or decreases in service. The model generates these estimates from projections of annual bus operating statistics based upon the quantity of service for the whole SCRTD system (i.e. a summation of the data for each specific route).

1.2 OVERVIEW OF THE MODEL STRUCTURE

Historically, most bus operating cost models have used level-of-service variables as the basis of the model and have selected those variables primarily from vehicle hours, vehicle miles, passenger boardings, number of pullouts, peak vehicle requirements, and revenue. Statistical analyses of bus operating costs have generally shown high correlations of cost with most of these variables, and conceptual arguments can be made for why various elements of the operating costs should be expected to relate to one or more of these variables. This cost model is based on selecting a set of level-of-service variables that meet several criteria:

1) the variables can be output from or derived from standard urban transportation simulation procedures for long-range forecasting

2) the variables are sufficient to forecast costs on all line items of the budget

3) the variables provide responsiveness to different types of service that may be offered, and to changes in service profile

Criterion 1 leads to a rejection of a variable such as pullouts, which is not readily derived from long-range forecasting techniques. Criterion 2 involves some application of judgment. It seems clear that vehicle hours and vehicle miles alone are unlikely to be adequate; for example, costs such as for bus cleaning are explained better by a fleet size measure than by miles and hours; while fare clerks, timetables, and transit police are explained best by numbers of passengers. Criterion 3 also suggests use of additional variables that would provide some differentiation between services offered throughout the day and peak-period-only services.

Cost-allocation models of operating costs have invariably taken the relatively simple approach to modeling by assuming that any budget item

or expenditure line item can be set to vary with one level-of-service variable. While it could be argued that a number of line items are probably a function of more than one variable, decisions on how to split the effects on two or more variables and establishing a modeling mechanism that would ensure consistency in the use of such split allocations would lead to a very complex model. To date, it has not been established that an increase in model accuracy and realism would be achieved that would justify the added complexity.

Based on these criteria, it was the judgment of the developers of this model that the following four level-of-service measures be used for the model:

1) annual vehicle miles
2) annual service hours
3) average weekday p.m. peak vehicles
4) annual passenger boardings

The model is a fixed/variable cost allocation model, as described in Technical Memorandum 5.1.2, dated June 1984. The basic concept of this approach is to allocate the cost of each element of service to one of the level-of-service measures. The different elements of service are defined as the individual reported line items of expenditure, or groupings of these. It is possible to allocate costs only to the finest level of detail in expenditure or budget reports for District operations.

To calibrate the model, it is necessary first to review the allocations and determine if any service costs should be allocated differently from the original model. Allocation of each cost to one service measure requires judgment. There is always the potential need to reconsider the allocation of certain cost items, and there is the possibility that new line items may be introduced in a subsequent year's budget. Thus, it is advisable to reevaluate the individual line-item cost allocation.

Second, the budget lines and the amounts of service for the calibration year need to be determined. From these, the coefficients are recalculated and the step sizes for stepwise variables are also recalculated. The coefficients are determined by computing, for each line item in the budget or expenditure report, a unit cost equal to the amount of the budget or expenditure line divided by the value of the variable to which the line item is allocated. These individual unit costs are summed for each of the level-of-service variables and define the coefficients. Thus, if Body Shop Wages in Central Maintenance equal $1,053,000 and these are allocated to Vehicle Miles, with a base value of 107,465,000, the unit cost of Body Shop Wages would be $0.00980. The unit costs of all other line items allocated to Vehicle Miles would then be summed to produce the coefficient of Vehicle Miles.

These two activities comprise the calibration of the model. Once the costs are determined and allocated, the coefficients (unit costs) are computed to produce a model of the form:

$$\$COST = a1\ VMT + a2\ VHT + a3\ PKBS + a4\ PASS$$

where:

VMT = Annual Vehicle Miles of Travel
VHT = Annual Vehicle Hours of Travel
PKBS = Average p.m. weekday Peak Bus Requirement
PASS = Annual Passenger Boardings

For FY 1984, the cost allocation model was:

$$\$COST = 1.063*VMT + 24.390*VHT + 55969*PKBS + 0.0744*PASS$$

All unit costs are in dollars in this equation, and are based on FY 1984 dollars (i.e. dollars at about December 1984).

For FY 1986, the recalibrated model is:

$$\$COST = 0.97*VMT + 25.82*VHT + 68088*PKBS + 0.1162*PASS$$

In this case, unit costs are in calendar 1985 dollars.

2. INPUT DATA BASE

2.1 OPERATING COSTS

The bus operating costs in the recalibrated model are based on the current SCRTD organization, the SCRTD departments, and the projected account expenditures for Fiscal Year 1986. The Annual Budget for FY 1986 was used as the basic resource document. In addition, the June 1985 Revenue and Expense Statement and input from the appropriate departments were used to subdivide some items of labor into more detailed components, and to provide estimates of the labor resources and costs for these.

2.2 OPERATING STATISTICS

The projected operating statistics were supplied by SCRTD for the FY 1986 operations. These statistics were used to calibrate the model for the FY 1986 base year. The specific statistics are:

Annual Vehicle Miles:	107,465,000
Annual Vehicle Hours:	7,585,000
Annual Unlinked Passenger Trips:	424,400,000
Average Weekday P.M. Peak Vehicles :	1,987

The vehicle miles and vehicle hours are total miles and hours in this calibration, as compared to revenue miles and revenue hours used in the original FY 1984 calibration and reported in Technical Memorandum 5.2.1. Conversion can be made between the two by using the ratio for FY 1984 of each of revenue miles and hours to total miles and hours, respectively. Based on Section 15 Reports for FY 1984, these ratios are:

Vehicle Miles (Revenue:Total) = 0.8763
Vehicle Hours (Revenue:Total) = 0.9253

2.3 STEP SIZES

Step sizes are defined for those expenditure categories where costs vary with the level-of-service variable by increments, rather than continuously. For example, wages and fringes for operators (drivers) are allocated to vehicle hours. However, each saving of a vehicle hour does not generate a saving of operator costs, given procedures of assigning operators to service and union and contract rules. In the model, it is assumed that a cost saving or an additional cost outlay is involved each time the change amounts to the equivalent of one half-time operator for the year. This change, in FY 1986, is estimated to occur when there is a saving of 853 vehicle hours. If a change in vehicle hours smaller than this amount takes place, no change in operator cost will be obtained. If a change larger than 853 hours annually is projected, a change in cost is assumed to occur. The change is determined by dividing the total projected change in vehicle hours by 853, and truncating the result to an integer value. This integer value represents the number of half-time operators saved by the change in vehicle hours. The cost savings are estimated by multiplying this number by 853 and then multiplying the

product by the unit cost of operator wages and fringes. Two numerical examples should serve to illustrate the process.

With Operator Wages determined to have a FY 1986 unit cost of $18.40 per vehicle hour, and Operator Fringes of $4.33:

1. Cost savings from a reduction of 500 vehicle hours annually:

   This value falls below the step size of 853 hours and therefore is assumed to provide no savings in operator wages and fringes.

2. Cost savings from a reduction of 10,000 vehicle hours annually:

   The value of 10,000 is divided by 853, yielding the result of 11.72. This is truncated to an integer value of 11, indicating that 11 half-time equivalent operators can be saved by this reduction. Further, 11 half-time operators work 9,383 vehicle hours annually, and this is the number of vehicle hours for which there will be a cost saving. Total cost savings from operator wages and fringes are obtained by multiplying $18.40 and $4.33 by 9,383, for a savings estimate of $1,726,472 in wages and $40,628.39 in fringes. Note that the further reduction of 617 (10,000 - 9,383) hours produces no additional cost savings on operators.

Step sizes are based on the primary categories of 1) an employee, 2) an operating division, and 3) a bus facility. Table 1 summarizes the step-size differences between FY 1984 and FY 1986 for these primary categories.

Because the number of employees at the District varies from Department to Department and from category to category, the step size (in miles, hours, buses, or passengers) also varies from Department to Department and from category to category. It can be seen that the average size of an operating division decreased from FY 1984 to FY 1986, with the average number of peak buses per operating division decreasing from 159 to 153. Similarly, the average size of a maintenance operating division decreased from 172 peak buses in FY 1984 to 153 in FY 1986.

Apart from these rather clear, recurrent step sizes, most of the remainder relate to employees in the Department or category, and show fluctuations between FY 1984 and FY 1986, in response to changes in the numbers of employees between FY 1984 actual employment and FY 1986 projected employment. In addition, there are changes in budgeting and organization that show up most strongly in Central Maintenance, where six line items from FY 1984 do not appear in the FY 1986 budget, while ten new line items appear in FY 1986. There is also a consistent change throughout the FY 1986 budgeting that Utilities are no longer separated from Miscellaneous Expenses, as they were in FY 1984.

TABLE 1

COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS	FY84	FY86
Miles	Maintenance Oper. Div. - Inspectors	1,251,605	2,149,300
	Maintenance Oper. Div. - Road Failure	N/I	17,910,833
	Maintenance Oper. Div. - Running Rep.	154,169	178,810
	Central Maintenance - Body Shop	N/I	3,358,281
	Central Maintenance - Body & Frame	1,463,415	N/I
	Central Maintenance - Cylinder Head	N/I	5,656,053
	Central Maintenance - Engine Line	N/I	3,980,185
	Central Maintenance - Engine Parts	N/I	13,433,125
	Central Maintenance - Engine Rebuild	2,439,026	N/I
	Central Maintenance - Engine Teardown	9,512,200	13,433,125
	Central Maintenance - Electrical Units	N/I	3,160,735
	Central Maintenance - Electrical Shop	2,972,563	N/I
	Central Maintenance - Frame Shop	N/I	8,266,538
	Central Maintenance - Machine Shop	7,317,077	7,676,071
	Central Maintenance - Mechanical Units	N/I	2,904,459
	Central Maintenance - Misc. Repair	31,707,333	N/I
	Central Maintenance - Paint Shop	2,320,049	5,656,053
	Central Maintenance - Radiator Shop	11,890,250	N/I
	Central Maintenance - Running Repairs	3,280,069	2,755,513
	Central Maintenance - Sheet Metal Shop	7,926,833	7,676,071
	Central Maintenance - Sign Shop	N/I	21,493,000
	Central Maintenance - Small Unit Shop	3,523,037	N/I
	Central Maintenance - Systems Shop	N/I	9,769,545
	Central Maintenance - Tool & Unit Room	N/I	26,866,250
	Central Maintenance - Transmission	3,280,069	3,582,167
	Central Maintenance - Welding Shop	6,794,429	4,477,708
	Central Maintenance - Upholstery Shop	6,341,467	8,266,538
	Non-Departmental - Workman's Comp.	59,451	69,332
	Non-Departmental - Provisions for Uninsured PD	39,634 @ $634	107,465 @ $2,531
	Non-Departmental - Expenses for PD	39,634 @ $456	107,465 @ $524
Hours	Transportation Oper. Div. - Operators	777	853
	Transportation Services - Street Superv.	476,800	421,400
	Transportation Instruction - Instructors	447,000	474,000
	Maintenance Oper. Div.- Non-revenue Wages	264,889	216,714

TABLE 1 (continued)

COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS	FY84	FY86
Hours (continued)			
	Transit Police - Transportation Service	420,706	446,176
	Scheduling Dept. - Schedule Maker Wages	596,000	329,783
	Accounting & Fiscal - Payroll Clerk	447,000	632,083
	Non-Departmental - Workman's Comp.	777	853
Peak Buses	Transportation Oper. Div. - Divisional Wages	159	153
	Transportation Oper. Div. - Services	159	153
	Transportation Oper. Div. - Materials & Supp.	159	153
	Transportation Oper. Div. - Utilities	159	N/I
	Transportation Oper. Div. - Misc. Expenses	159	153
	Transportation Services - Radio Dispatchers	159	153
	Transportation Services - Utilities	159	N/I
	Transportation Instruction- Divisional Wages	172	N/I
	Maintenance Oper. Div. - Service Deep Clean	32	33
	Maintenance Oper. Div. - Servicing	5.6	5.8
	Maintenance Oper. Div. - Servicing Supervisor	188	153
	Maintenance Oper. Div. - Wheelchair Maint.	34.4	33.1
	Maintenance Oper. Div. - Farebox Maintenance	206	60.2
	Maintenance Oper. Div. - Campaigns & Reserve	60.7	N/I
	Maintenance Oper. Div. - Supervision & Admin.	172	153
	Maintenance Oper. Div. - Special Projects	N/I	110
	Maintenance Oper. Div. - Training & Oth.Fringe	172	153
	Maintenance Oper. Div. - Services for Div.	172	153
	Maintenance Oper. Div. - Tools & Exp. Equip.	172	Direct by Miles
	Maintenance Oper. Div. - Other Mat. & Supp.	172	N/I
	Maintenance Oper. Div. - Utilities	172	N/I
	Maintenance Oper. Div. - Miscellaneous Exp.	172	153
	Central Maintenance - Service Wages	121	117
	Central Maintenance - Central Shop Superv.	138	166
	Facilities Maintenance - Electrical Maint.	147	142
	Facilities Maintenance - Property Maint.	147	142
	Facilities Maintenance - Electronic Maint.	N/I	47
	Facilities Maintenance - Materials & Supplies	147	142

TABLE 1 (continued)

COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS	FY84	FY86
Peak Buses (continued)	Maintenance General - Instruction	188	142
	Telecommunications - Electronic Maintenance	56	N/I
	Scheduling - Checkers	40.5	31.5
	Contract Procurement - Stores	159	153
Passengers	Transit Police - Passenger Security	13,688,235	12,482,353
	Marketing & Comm. - Ticket Clerks	21,154,545	19,290,909
	Customer Relations - Telephone Clerks	4,951,064	4,715,555
	Accounting & Fiscal - Cash Clerks	16,621,429	12,860,606
	Nondepartmental - Provisions for Uninsured PL	101,174 @ $4,916	163,231 @ $14,481
	Nondepartmental - Expenses for PL	101,174 @ $456	163,231 @ $524

2.4 DIRECTLY-VARIABLE ITEMS

Directly-variable items are much simpler than stepwise variable items. These are expenditures that can be assumed to vary with every increment or decrement of the level-of-service variable to which they are allocated. For example, fuel is allocated to vehicle miles as a directly-variable item, with a unit cost of $0.2521 in FY 1986. By allocating fuel as a directly-variable item, it is assumed that each change of a vehicle mile will produce a cost change of $0.2521. Thus, a decrease of 1,000 vehicle miles will save $252.10, and an increase of 10,000 vehicle miles will increase costs by $2,521.

The model contains very few line items that are assumed to vary directly with one of the variables used in the model. Table 2 shows the line items that are assumed to vary directly for each of FY 1984 and FY 1986. The differences between FY 1984 and FY 1986 are minor: under Maintenance Operating Divisions, the Expendable Equipment for Revenue Vehicles is not split into component entries in FY 1986, but is in FY 1984; and Telecommunications equipment on revenue vehicles has moved from the Telecommunications Department to Facilities Maintenance between FY 1984 and FY 1986. Essentially, these changes have no net effect on the allocation of costs to direct variables.

TABLE 2

COMPARISON OF DIRECTLY VARIABLE ITEMS BETWEEN FY84 AND FY86

VARIABLE	LINE ITEM	FY84	FY86
Miles	Maintenance Operating Div. - Expendable Equipment for Revenue Vehicles	No	Yes
	Maintenance Operating Div. - Lubricants (Rev. Veh.)	Yes	No
	Maintenance Operating Div. - Tires & Tubes (Rev Veh)	Yes	No
	Maintenance Operating Div. - Bus Parts (Rev. Veh.)	Yes	No
	Nondepartmental Expenses - Fuel	Yes	Yes
	Nondepartmental Expenses - Fuel & Lube Taxes (Rev.)	Yes	Yes
Hours		None	None
Peak Buses	Telecommunications - Mat.& Supp.(Revenue Equip.)	Yes	No
	Facilities Maint. - Mat. & Supplies (Radio)	No	Yes
Passengers	Print Shop - Timetables	Yes	Yes

2.5 FIXED ITEMS

All remaining budget line items are considered to be fixed costs, and these are allocated, for fully-allocated costing at the line level, to one of the four variables used by the model. Unit costs are computed, as for the other expenditure items, for each line item that is defined as a fixed cost. If a change in service is examined, by definition there will be no changes to total fixed costs. Therefore, the unit cost of each fixed-cost item is recomputed, to yield the same total fixed cost for before the change in service.

Thus, for example, Wages for the General Manager's office are assigned as a fixed cost to peak buses, with a FY 1986 unit cost of $179.668. If a service change is examined that will reduce peak buses from the FY 1986 value of 1987 (buses for the average p.m. weekday peak) to 1968, the unit cost for Wages for the General Manager's office will increase to $181.402.

Rather than provide a detailed listing of all fixed-cost items for each year, Table 3 documents the differences between FY 1984 and FY 1986 in the make-up of line items and their allocation for the purposes of line costing. The general change, mentioned in Section 2.3 above, of combining Utilities into Miscellaneous Expenses or charging them under Nondepartmental Expenses in FY 1986 instead of keeping as a separate line item by department as in FY 1984, is not included in this table, because it happens consistently in all departments and generally represents no net change in the amounts allocated.

Several of the entries in Table 3 represent minor budget changes between FY 1984 and FY 1986. For example, inclusion of a "Services" or a "Miscellaneous Expenses" line item in several departments in one year and not the other indicates merely a zero budget line on that item for the year where it is omitted.

Table 3 also shows evidence of some reorganization within the SCRTD, but without any change in the allocation variable for the fixed costs. For example, the Human Relations Department has changed to an Equal Employment Opportunity Department and a DBE/WBE Department. Telecommunications has been absorbed into Facilities Maintenance, and new departments for Transit Systems Development, Risk Management, and Contract Compliance have been added.

There are also a few additional changes in detail in the allocations used that do not affect the underlying process. Several departments allocated to fixed costs have detailed itemized costs in the FY 1984 expenditures reports, using categories of Services, Materials and Supplies, and Miscellaneous Expenses. In the FY 1986 budget materials, treatment of these has been simplified to a category of "Non-Labor Expenses."

TABLE 3

DIFFERENCES IN ALLOCATION OF FIXED-COST ITEMS BETWEEN FY84 AND FY86

LINE ITEM	ALLOCATION VARIABLE FY84	FY86
Stops & Zones - Miscellaneous Expenses	-	Peak Buses
Transportation Instruction - Services	Peak Buses	-
Maintenance Operating - Servicing Fringes Fixed	Peak Buses	*
Central Maintenance - Training and Other Fringes	Peak Buses	*
Central Maintenance - Services	Peak Buses	*
Central Maintenance - Miscellaneous Expenses	Peak Buses	*
Telecommunications - Administration Wages	Peak Buses	#
Telecommunications - Fringes	Peak Buses	#
Telecommunications - Services	Peak Buses	#
Telecommunications - Materials & Supplies	Peak Buses	#
Telecommunications - Utilities & Misc. Exp.	Peak Buses	#
A.G.M. for Planning & Comm. - Services	Peak Buses	-
Human Relations - Wages	Peak Buses	-
Human Relations - Fringes	Peak Buses	-
Human Relations - Services	Peak Buses	-
Human Relations - Materials & Supplies	Peak Buses	-
Human Relations - Utilities & Misc. Exp.	Peak Buses	-
Equal Employment Opp. - Wages	-	Peak Buses
Equal Employment Opp. - Fringes	-	Peak Buses
Equal Employment Opp. - Materials and Supplies	-	Peak Buses
Equal Employment Opp. - Utilities & Misc. Exp.	-	Peak Buses
Contract Compliance - Wages	-	Peak Buses
Contract Compliance - Fringes	-	Peak Buses
Contract Compliance - Materials and Supplies	-	Peak Buses
Contract Compliance - Utilities & Misc. Exp.	-	Peak Buses
DBE/WBE - Wages	-	Peak Buses
DBE/WBE - Fringes	-	Peak Buses
DBE/WBE - Materials and Supplies	-	Peak Buses
DBE/WBE - Utilities & Misc. Exp.	-	Peak Buses

* Not Separated from nondepartmental expenses in FY 1986.

\# Department reassigned under Facilities Maintenance in FY 1986.

TABLE 3 (continued)

DIFFERENCES IN ALLOCATION OF FIXED-COST ITEMS BETWEEN FY84 AND FY86

LINE ITEM			ALLOCATION VARIABLE FY84	FY86
AGM for Transit System Dev.	-	Materials and Supplies	Peak Buses	-
AGM for Transit System Dev.	-	Utilities & Misc. Exp.	Peak Buses	-
AGM for Management	-	Services	-	Peak Buses
Employee Activities	-	Fringes	*	Peak Buses
Transit System Dev.	-	Wages	-	Peak Buses
Transit System Dev.	-	Fringes	-	Peak Buses
Transit System Dev.	-	Materials and Supplies	-	Peak Buses
Transit System Dev.	-	Utilities & Misc. Exp.	-	Peak Buses
Risk Management	-	Wages	-	Peak Buses
Risk Management	-	Fringes	-	Peak Buses
Risk Management	-	Materials and Supplies	-	Peak Buses
Risk Management	-	Utilities & Misc. Exp.	-	Peak Buses

* Not Separated from nondepartmental expenses in FY 1986.
\# Department reassigned under Facilities Maintenance in FY 1986.

3. FY 1986 CALIBRATION OF COST ALLOCATION

3.1 ALLOCATION OF COSTS

Table 4 shows the complete itemization of the FY 1986 budget items and their allocation to the four variables and three types of allocation relationship. This table may be compared directly with Table 1 in Technical Memorandum 5.1.2 (June, 1984) to confirm the various differences pointed out in the foregoing sections. The Table shows the allocation of a Projected FY 1986 budget of $484,174,000, compared to the earlier allocation of an Estimated FY 1984 budget of $425,697,000.

It is important to note that the FY 1986 Cost Allocation is based on a projected (not actual) budget and for a slightly reorganized structure for SCRTD. The FY 1984 cost allocation was based on actual expenditures for three of the four quarters in FY 1984, plus estimates of the remaining expenditures in FY 1984. Similarly, the hours, miles, and passengers are annual totals for FY 1986 that are projected, while for FY 1984 they were actual expenditures for three quarters and estimates for the last quarter. Peak buses are based on weekday p.m. peak actuals for the first 9 months of FY 1984 and are projected for FY 1986.

Applying the FY 1984 coefficients (adjusted from revenue hours and miles to total miles and hours), the projected FY 1986 cost in 1984 dollars would be $414,137,000.

3.2 INFLATION EFFECTS

The change in CPI for the Los Angeles-Long Beach area between mid FY 1984 (December 1983) and the end of FY 1986 (which is the time for which the budget is assumed to be correct) in June 1986 is 11.285%. Applying this change to the annual expenditure for FY 1984 would project FY 1986 costs of $460,873,000. This percentage change provides a budget figure that requires an additional upward adjustment of 5.0558% to match the projections made for FY 1986. Applying the total of these two adjustments to the unit costs from the FY 1984 model produces the estimates shown in Table 5. As expected, the annual costs would then be projected as $484,152,000, which is (within rounding error) the result that should be achieved.

Of much more interest is to observe that the inflation adjustment provides coefficients for miles and hours that are marginally higher than the calibrated values for FY 1986, while the other two coefficients are underestimated for FY 1986. No correction has been made in this process for changes to the miles, hours, buses, and passengers variables that would require spreading fixed costs over a smaller base and would also adjust step sizes. The results of such adjustments are reported in a second Technical Memorandum, number 86.5.2 (November, 1985).

Table 4
BUS COST ALLOCATION

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Board of Directors								
Wages	0			X		X		
Fringes	0			X		X		
Services	73			X		X		
Materials and Supplies	5			X		X		
Miscellaneous Expenses	67			X		X		
General Manager								
Wages	357			X		X		
Fringes	0			X		X		
Services	211			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	41			X		X		
Office of District Secretary								
Wages	274			X		X		
Fringes	0			X		X		
Services	55			X		X		
Materials and Supplies	9			X		X		
Miscellaneous Expenses	49			X		X		
Legal								
Wages	392			X		X		
Fringes	4			X		X		
Services	330			X		X		
Materials and Supplies	5			X		X		
Miscellaneous Expenses	11			X		X		
Assistant General Manager for Operations								
Wages	317			X		X		
Fringes	2			X		X		
Services	0			X		X		
Materials and Supplies	7			X		X		
Miscellaneous Expenses	7			X		X		
Transportation Operating Divisions								
Wages	7,899			X			X	By 153 Peak Vehicles
Fringes	1,731			X			X	By 153 Peak Vehicles
Operator Wages	139,552	X					X	By 853 Revenue Hours
Operator Fringes	32,806	X					X	By 853 Revenue Hours
Services	1			X			X	By 153 Peak Vehicles
Materials and Supplies	97			X			X	By 153 Peak Vehicles
Miscellaneous Expenses	14			X			X	By 153 Peak Vehicles
Stops and Zones								
Wages	738			X		X		
Fringes	3			X		X		
Services	6			X		X		
Materials and Supplies	103			X		X		
Miscellaneous Expenses	1			X		X		
Operations Control and Services								
Wages	1,864			X		X		
Wages	2,523	X				X		
Wages	649	X					X	By 421,400 Hours of Service
Fringes	143	X					X	By 421,400 Hours of Service
Wages	938			X		X		
Wages	469			X			X	By 153 Peak Vehicles
Fringes	104			X			X	By 153 Peak Vehicles
Fringes	25			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Operations Control and Services (cont'd)								
Services	1			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	3			X		X		
Transportation Instruction								
Wages	748			X		X		
Wages	580	X					X	By 474,000 Hours of Service
Fringes	128	X					X	By 474,000 Hours of Service
Fringes	8			X		X		
Materials and Supplies	34			X		X		
Miscellaneous Expenses	6			X		X		
Transportation General								
Wages	575	X				X		
Fringes	11	X				X		
Services	11	X				X		
Materials and Supplies	509	X				X		
Miscellaneous Expenses	180	X				X		
Maintenance Operating Divisions								
Servicing Deep Clean Wages	1,538			X			X	By 33 Peak Vehicles
Servicing Deep Clean Fringes	375			X			X	By 33 Peak Vehicles
Servicing Wages	8,789			X			X	By 5.8 Peak Vehicles
Servicing Fringes	2,155			X			X	By 5.8 Peak Vehicles
Servicing Supervisor Wages	428			X			X	By 153 Peak Vehicles
Servicing Supervisor Fringes	100			X			X	By 153 Peak Vehicles
Wheelchair Maintenance Wages	1,974			X			X	By 33.1 Peak Vehicles
Wheelchair Maintenance Fringes	438			X			X	By 33.1 Peak Vehicles
Non-Revenue Wages	970	X					X	By 216,714 Hours
Non-Revenue Fringes	234	X					X	By 216,714 Hours
Farebox Maintenance Wages	1,086			X			X	By 60.2 Peak Vehicles
Farebox Maintenance Fringes	240			X			X	By 60.2 Peak Vehicles
Inspection Wages	1,645		X				X	By 2,149,300 Miles
Inspection Fringes	364		X				X	By 2,149,300 Miles
Running Repair Wages	19,773		X				X	By 178,810 Miles
Running Repair Fringes	4,379		X				X	By 178,810 Miles
Supervision and Administration Wages	6,587			X			X	By 153 Peak Vehicles
Supervision and Administration Fringes	1,316			X			X	By 153 Peak Vehicles
Road Failure Wages	197		X				X	By 17,910,833 Miles
Road Failure Fringes	44		X				X	By 17,910,833 Miles
Special Projects Wages	592			X			X	By 110 Peak Vehicles
Special Projects Fringes	131			X			X	By 110 Peak Vehicles
Servicing Wages Fixed	282			X		X		
Training and Other Fringe Benefits	637			X			X	By 153 Peak Vehicles
Services for Diviaions	285			X			X	By 153 Peak Vehicles
Lubricants, Tires and Tubes, Bus Parts, and Tools and Expendable Equipment for Revenue Equipment	25,421		X				X	Directly By Miles
Miscellaneous Expenses	123			X			X	By 153 Vehicles
Central Maintenance								
Running Repair Wages	1,283		X				X	By 2,755,513 Miles
Running Repair Fringes	284		X				X	By 2,755,513 Miles
Engine Teardown Wages	263		X				X	By 13,433,125 Miles
Engine Teardown Fringes	58		X				X	By 13,433,125 Miles
Cylinder Head Wages	625		X				X	By 5,656,053 Miles
Cylinder Head Fringes	138		X				X	By 5,656,053 Miles
Engine Line Wages	886		X				X	By 3,980,185 Miles
Engine Line Fringes	197		X				X	By 3,980,185 Miles
Engine Parts Crib Wages	263		X				X	By 13,433,125 Miles
Engine Parts Crib Fringes	58		X				X	By 13,433,125 Miles

Table 4
BUS COST ALLOCATION (continued)

Department and Expense	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Central Maintenance (cont'd)								
Electrical Units Wages	1,119		X				X	By 3,160,735 Miles
Electrical Units Fringes	248		X				X	By 3,160,735 Miles
Mechanical Units Wages	1,217		X				X	By 2,904,459 Miles
Mechanical Units Fringes	270		X				X	By 2,904,459 Miles
Transmission Wages	987		X				X	By 3,582,167 Miles
Transmission Fringes	219		X				X	By 3,582,167 Miles
Welding Shop Wages	790		X				X	By 4,477,708 Miles
Welding Shop Fringes	175		X				X	By 4,477,708 Miles
Machine Shop Wages	461		X				X	By 7,676,071 Miles
Machine Shop Fringes	102		X				X	By 7,676,071 Miles
Body Shop Wages	1,053		X				X	By 3,358,281 Miles
Body Shop Fringes	233		X				X	By 3,358,281 Miles
Frame Shop Wages	428		X				X	By 8,266,538 Miles
Frame Shop Fringes	95		X				X	By 8,266,538 Miles
Sheet Metal Shop Wages	461		X				X	By 7,676,071 Miles
Sheet Metal Shop Fringes	102		X				X	By 7,676,071 Miles
Upholstery Shop Wages	428		X				X	By 8,266,538 Miles
Upholstery Shop Fringes	95		X				X	By 8,266,538 Miles
Systems Shop Wages	362		X				X	By 9,769,545 Miles
Systems Shop Fringes	80		X				X	By 9,769,545 Miles
Paint Shop Wages	625		X				X	By 5,656,053 Miles
Paint Shop Fringes	138		X				X	By 5,656,053 Miles
Sign Shop Wages	165		X				X	By 21,493,000 Miles
Sign Shop Fringes	36		X				X	By 21,493,000 Miles
Tool and Unit Room Wages	132		X				X	By 26,866,250 Miles
Tool and Unit Room Fringes	29		X				X	By 26,866,250 Miles
Service Wages	436			X			X	By 117 Peak Vehicles
Service Fringes	108			X			X	By 117 Peak Vehicles
Central Shop Supervision Wages	471			X			X	By 166 Peak Vehicles
Central Shop Supervision Fringes	103			X			X	By 166 Peak Vehicles
Central Shop Administration Wages	601			X		X		
Maintenance General Department								
Instruction Wages	580			X			X	By 142 Peak Vehicles
Instruction Fringes	122			X			X	By 142 Peak Vehciles
Wages	1,715			X		X		
Non-Labor Expenses	371			X		X		
Equipment Engineering Department								
Wages	618			X		X		
Non-Labor Expenses	89			X		X		
Facilities Maintenance Department								
Electrical Maintenance Wages	799			X			X	By 142 Peak Vehicles
Electrical Maintenance Fringes	174			X			X	By 142 Peak Vehicles
Property Maintenance Wages	1,546			X			X	By 142 Peak Vehicles
Property Maintenance Fringes	342			X			X	By 142 Peak Vehicles
Electronic Maintenance Wages	1,382			X			X	By 47 Peak Vehicles
Electronic Maintenance Fringes	306			X			X	By 47 Peak Vehicles
Administration and Supervision Wages	3,056			X		X		
Training and Fringe Benefits	74			X		X		
Services	58			X		X		
Materials and Supplies - Radio	150			X			X	Directly By Peak Vehicles
Materials and Supplies - Facilities	1,000			X			X	By 142 Peak Vehicles
Materials and Supplies	730			X		X		
Miscellaneous Expenses	61			X		X		
Transit Police Department								
Police Wages	941				X		X	By 12,482,353 Passengers
Police Fringes	231				X		X	By 12,482,353 Passengers
Police Wages	471	X					X	By 446,176 Hours
Police Fringes	115	X					X	By 446,176 Hours
Administrative Wages	2,740			X		X		
Fringes	71			X		X		
Services	228			X		X		
Materials and Supplies	52			X		X		
Miscellaneous Expenses	36			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Scheduling Department								
Schedule Maker Wages	786	X					X	By 329,783 Hours
Schedule Maker Fringes	181	X					X	By 329,783 Hours
Checker Wages	2,207			X			X	By 31.5 Peak Vehicles
Checker Fringes	483			X			X	By 31.5 Peak Vehicles
Wages	1,129			X		X		
Fringes	3			X		X		
Services	45			X		X		
Materials and Supplies	43			X		X		
Miscellaneous Expenses	61			X		X		
Assistant General Manager for Planning and Communications								
Wages	111			X		X		
Fringes	1			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	2			X		X		
Planning								
Wages	2,400			X		X		
Fringes	6			X		X		
Services	322			X		X		
Materials and Supplies	68			X		X		
Miscellaneous Expenses	35			X		X		
Marketing and Communications								
Ticket Clerk Wages	556				X		X	By 19,290,909 Passengers
Ticket Clerk Fringes	125				X		X	By 19,290,909 Passengers
Wages	1,468				X	X		
Fringes	16				X	X		
Services	484				X	X		
Materials and Supplies	887				X	X		
Miscellaneous Expenses	128				X	X		
Customer Relations								
Telephone Clerks Wages	2,170				X		X	By 4,715,555 Passengers
Telephone Clerks Fringes	501				X		X	By 4,715,555 Passengers
Wages	1,157				X	X		
Fringes	15				X	X		
Services	21				X	X		
Materials and Supplies	28				X	X		
Miscellaneous Expenses	14				X	X		
Assistant General Manager for Government and Community Affairs								
Wages	107			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	5			X		X		
Government Affairs								
Wages	277			X		X		
Fringes	3			X		X		
Services	86			X		X		
Materials and Supplies	7			X		X		
Miscellaneous Expenses	38			X		X		
Community Relations								
Wages	189			X		X		
Fringes	7			X		X		
Services	21			X		X		
Materials and Supplies	38			X		X		
Miscellaneous Expenses	26			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passen-gers	Fixed	Variable	If Variable How?
Assistant General Manager for Equal Opportunity								
Wages	83			X		X		
Services	4			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	11			X		X		
Equal Employment Opportunity								
Wages	140			X		X		
Fringes	2			X		X		
Materials and Supplies	5			X		X		
Miscellaneous Expenses	3			X		X		
Contract Compliance								
Wages	71			X		X		
Fringes	1			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	3			X		X		
Employee Education, Training and Development								
Wages	1,166			X		X		
Fringes	342			X		X		
Services	33			X		X		
Materials and Supplies	5			X		X		
Miscellaneous Expenses	11			X		X		
DBE/MBE								
Wages	74			X		X		
Fringes	1			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	3			X		X		
Controller-Treasurer-Auditor								
Wages	275			X		X		
Fringes	6			X		X		
Services	1			X		X		
Materials and Supplies	3			X		X		
Miscellaneous Expenses	13			X		X		
Accounting and Fiscal								
Payroll Clerk Wages	305	X					X	By 632,083 Hours
Payroll Clerk Fringes	68	X					X	By 632,083 Hours
Cash Clerk Wages	873				X		X	By 12,860,606 Passengers
Cash Clerk Fringes	192				X		X	By 12,860,606 Passengers
Wages	1,767			X		X		
Fringes	21			X		X		
Services	277			X		X		
Materials and Supplies	34			X		X		
Miscellaneous Expenses	11			X		X		
Data Processing								
Wages	3,515			X		X		
Fringes	43			X		X		
Services	1,332			X		X		
Materials and Supplies	251			X		X		
Miscellaneous Expenses	148			X		X		
Assistant General Manager for Transit System Development								
Wages	26			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department and Expense Item	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Transit Systems Development								
Wages	1,064			X		X		
Services	155			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	3			X		X		
Bus Facilities Engineering								
Wages	353			X		X		
Fringes	9			X		X		
Services	262			X		X		
Materials and Supplies	40			X		X		
Miscellaneous Expenses	39			X		X		
Assistant General Manager for Management								
Wages	112			X		X		
Services	2			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	4			X		X		
Safety Department								
Wages	198			X		X		
Fringes	4			X		X		
Services	172			X		X		
Materials and Supplies	67			X		X		
Miscellaneous Expenses	34			X		X		
Insurance								
Wages	230			X		X		
Fringes	2			X		X		
Services	37			X		X		
Materials and Supplies	2			X		X		
Miscellaneous Expenses	6			X		X		
Risk Management								
Wages	79			X		X		
Fringes	1			X		X		
Materials and Supplies	1			X		X		
Miscellaneous Expenses	2			X		X		
Contract Procurement & Material								
Stores Wages	1,035			X			X	By 153 Peak Vehicles
Stores Fringes	223			X			X	By 153 Peak Vehicles
Wages	3,612			X		X		
Fringes	40			X		X		
Services	37			X		X		
Materials and Supplies	113			X		X		
Miscellaneous Expenses	64			X		X		
Personnel Department								
Wages	1,581			X		X		
Fringes	8			X		X		
Services	711			X		X		
Materials and Supplies	112			X		X		
Miscellaneous Expenses	65			X		X		
General Services								
Wages	2,143			X		X		
Fringes	4			X		X		
Services	24			X		X		
Materials and Supplies	290			X		X		
Miscellaneous Expenses	2			X		X		

Table 4
BUS COST ALLOCATION (continued)

Department and Expense	Estimated FY 84 Cost ($000)	Resource Allocated to: Hours	Miles	Peak Buses	Passengers	Fixed	Variable	If Variable How?
Print Shop								
Wages	779			X		X		
Fringes	6			X		X		
Services	76			X		X		
Timetables	476				X		X	Directly by Passengers
Materials and Supplies	24			X		X		
Miscellaneous Expenses	3			X		X		
Management and Budget								
Wages	566			X		X		
Fringes	6			X		X		
Services	3			X		X		
Materials and Supplies	9			X		X		
Miscellaneous Expenses	5			X		X		
Labor Relations								
Wages	261			X		X		
Fringes	3			X		X		
Services	43			X		X		
Materials and Supplies	10			X		X		
Miscellaneous Expenses	8			X		X		
Employee Activities								
Wages	124			X		X		
Fringes	2			X		X		
Services	1			X		X		
Materials and Supplies	7			X		X		
Miscellaneous Expenses	32			X		X		
Nondepartmental Expenses								
Wages	1,214			X		X		
Fringes	15,500			X		X		
Workman's Compensation	14,950	X					X	By 853 Hours
Workman's Compensation	5,750		X				X	By 69,332 Miles
Workman's Compensation	2,300			X		X		
Services	7,896			X		X		
Fuel	27,090		X				X	Directly by Miles
Materials and Supplies	850			X		X		
Utilities	5,206			X		X		
Premiums for Physical Damage	22			X		X		
Premiums for PL & PD Insurance	190			X		X		
Premiums for Corporate Insurance	578			X		X		
Provisions for Uninsured PL PL	37,650				X		X	By 163,231 Passengers at $14,481 Each
Provisions for Uninsured PD	2,531		X				X	By 107,465 Miles at $2,531 Each
Expenses for PL PL	1,362				X		X	By 163,231 Passengers at $524 per Step
Expenses for PD PD	524		X				X	By 107,465 Miles at $524 per Step
Fuel and Lube Taxes Non-Revenue Equipment	60	X				X		
Fuel and Lube Taxes Revenue Equipment	1,957		X				X	Directly By Miles
Leases and Rentals	7,106			X		X		
TOTAL	$484,174							

TABLE 5

COMPARISON OF COEFFICIENTS BETWEEN FY84 AND FY86, ADJUSTED FOR INFLATION

COEFFICIENT	FY84 CALIBRATION	ADJUSTED FOR INFLATION	ADJUSTED FOR REAL INCREASE	FY86 CALIBRATION
Revenue Miles	1.063	1.1830	1.243	*
Total Miles1	0.932	1.037	1.089	0.97
Revenue Hours	24.39	27.14	28.52	*
Total Hours2	22.57	25.12	26.39	25.82
Peak Buses	55,969	62,285	65,441	68,088
Passengers	0.0744	0.0828	0.0870	0.1162

* In FY 1986, no values are projected for revenue miles and revenue hours.

1. Coefficients are factored by the ratio of revenue miles to total miles in FY 1984 (93,031,164/106,163,110).

2. Coefficients are factored by the ratio of revenue hours to total hours in FY 1984 (7,062,585/7,632,855).

DRAFT

GENERAL PLANNING CONSULTANT:

TECHNICAL MEMORANDUM 86.5.2

SENSITIVITY ANALYSES FOR THE BUS COST MODEL: SERVICE CHANGES AND INTERNAL RECALIBRATION

Prepared for:

Southern California Rapid Transit District

Prepared by:

Schimpeler Corradino Associates

in association with

Barton-Aschman Associates, Inc.
Cordoba Corporation
Myra L. Frank & Associates
Manuel Padron
The Planning Group, Inc.

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1. INTRODUCTION

1.1 BACKGROUND

Technical Memorandum 86.5.1 (November 1985) describes the bus operating cost-allocation model currently under development for the District by the GPC. Technical Memorandum 86.5.3 (December 1985) provides statistics on the model and provides details on the application of the model for short-range service changes.

While the bus operating cost model is calibrated in a specific year of operation of the District, there is a procedure inherent to the model that allows it to be recalibrated internally to adjust for inflation and changes in service levels provided. Such recalibration requires the assumption that there are no significant organizational changes made in the District, and that the number of operating divisions and maintenance operating divisions remain unchanged.

The bus operating cost model is designed to allow the District to compute the operating expenses for bus operation associated with either increases or decreases in service. The model generates these estimates from projections of annual bus operating statistics based upon the quantity of service for the whole SCRTD system (i.e., a summation of the data for each specific route). The costs of individual lines, and service by periods within a line, can be estimated by using systemwide averages of productivity and costs of different elements of operation and maintenance activities and staffing. As part of the procedure applied in these sensitivity tests, a spreadsheet has been built in Appleworks to compute the costs for any incremental change in service. Details of the use of these spreadsheets are provided within this document.

1.2 DESCRIPTION OF THE SENSITIVITY TESTS

The first sensitivity test was to perform an internal calibration of the FY 1984 coefficients to FY 1985 service levels and project FY 1985 expenditures. The aim of this test is to determine the ability of the model to respond to changes in District structure and service levels, and to provide guidance on the frequency with which full calibration to a new budget or financial statement will be needed. Having performed this update to FY 1985, a further update was undertaken to FY 1986, in order to compare the results with the FY 1986 full calibration. Because the period from FY 1984 to FY 1986 covers a number of organizational and service level changes, this was felt to be a quite stringent test of the robustness of the cost-allocation model.

The second sensitivity test was to determine the ability of the model to project costs for a package of service changes, and to determine whether or not it is necessary to undertake an internal recalibration of the model whenever such a package of changes is examined. The test was also intended to provide a comparison between the existing cost model used by the District and the results that can be expected from substituting the GPC Cost Model.

As part of the investigation of potential service cuts that the District might implement if UMTA operating assistance were cut under the FY 1986 federal budget, the Planning Department assembled a list of service cuts that were aimed at saving a total of $10 million per year in operating and maintenance costs. The estimation of the extent of the savings to be obtained was determined by using the current version of the Scatchard Model, reduced by a factor of 25 percent (to account for fixed overhead costs) and net of revenues.

Two sensitivity tests were designed to be executed with this procedure. First, it was desired to determine the results of a straightforward application of the GPC cost model. In this application, marginal costs would be estimated, and all step sizes would remain the same as in calibration. This estimation would provide a comparison of the GPC cost model with the Scatchard model and would also indicate what is involved in application of the GPC model to small service changes. Second, it was desired to determine how much effect there would be on the estimated cost savings if the model is internally recalibrated before completing the cost estimation. This would provide an indication of the extent to which such recalibration may or may not be necessary for short-range application of the model to cost service changes.

2. DESCRIPTION OF THE PROCEDURES

2.1 INTERNAL RECALIBRATION OF THE COST MODEL

The procedure used to undertake the internal recalibration consists of several steps.

A. Determine the change in CPI from the original calibration year to the update year.

B. Determine the total budget from the original calibration year for each level-of-service variable and for each type of variation (fixed, direct, stepwise).

C. Apply a CPI adjustment to each budget value obtained in step B.

D. Divide each budget line by the update year's values of peak buses, vehicle miles, vehicle hours, and passenger boardings.

The result of step D is to obtain new coefficients for each of the fixed, directly variable, and stepwise variable components of each level-of-service allocation. In addition, by simply summing the escalated budget lines from Step C, the total systemwide budget for the year can be obtained, as forecast by the model.

2.2 DIRECT MODEL APPLICATION WITHOUT RECALIBRATION

In this procedure, the GPC model is used in a fairly complex, sequential process. The service cuts constituted specification of a route number and the period of service to be cut, either Sunday, Saturday, or weekday. In working through the list, a route for which Sunday service was cut early in the process might appear later with Saturday service to be cut, and later again with weekday service to be cut. Because the GPC cost model takes account of the true nature of District operations and permits cost savings only when whole staff positions can be saved, it is necessary to re-estimate savings with a sequential buildup of the amount of service on a line to be cut. In addition, further economies can be gained within an Operating Division when service on several routes is to be cut from a single Operating Division, while yet other savings accrue on a systemwide basis, as service cuts are accumulated. The GPC cost model is not structured currently to allow such estimates to be made efficiently. As a result, the scale economies for individual Operating Divisions and the entire system were estimated only at the completion of all cost estimates.

Three different spreadsheets were created to permit the cost estimates to be obtained. The first is designed for line use and requires entry of the line number, division number, any modification to the annualization factors coded into the spreadsheet, and entry of average figures for p.m. peak buses (weekday only), total vehicle hours, total vehicle miles, passenger boardings, and revenue for any or all of an average weekday, an average Saturday, and an average Sunday. These inputs are structured to be consistent with the Line Performance Trend Reports. The spreadsheet

then uses these input data to compute the operating costs both gross and net of revenue. Costs are determined on an annual basis, and the spreadsheet also calculates annual values of each of the vehicle hours, vehicle miles, passenger boardings, and revenue.

The second spreadsheet contains only those items identified as "Step D," which are the stepwise costs incurred on a divisional basis. This spreadsheet operates in the same manner as the first one, except that totals of average daily values of peak buses, vehicle hours, vehicle miles, passenger boardings, and revenue from all lines to be cut from or added to a single operating division are entered, instead of the values pertaining to a single route. The third spreadsheet contains all the items not included in the Divisional spreadsheet, i.e., the Direct items and the "Step S" items. Inputs to this spreadsheet are the sum totals of all peak buses, vehicle hours, vehicle miles, passenger boardings, and revenue for all service to be cut or added, Districtwide. No deduction is made from these costs for revenue, this being done at the Division level. Estimates of total savings (or costs) are obtained by adding together the results from all Division spreadsheets and the systemwide spreadsheets, and can be done for gross costs and for net costs (net of revenue).

2.3 MODEL APPLICATION WITH RECALIBRATION

The GPC model is based largely on stepwise variable elements and also contains a provision to allow fully-allocated costs to be obtained. The step sizes are determined by finding the average productivity of each line item in the budget. For example, there may be 4,445 full-time equivalent (FTE) bus operators employed by the District, with the operation of 7,585,000 total vehicle hours. This calculates out to an average of 1706 vehicle hours per FTE operator. Because the District can hire part-time operators, the smallest increment of a bus operator is one-half of the FTE productivity, or 853 vehicle hours. When service is cut, both the annual vehicle hours and the number of operators will be cut, but with the result that the step size may change. This changed step size needs to be recalibrated into the model. In addition, if fully-allocated costs are being used, the fixed costs are now being spread over a smaller base of buses, hours, miles, and passengers, so that the allocation to any line is larger. These changes in allocation represent an internal recalibration of the model which should be done whenever large changes are made in service levels, as well as when the model is to be applied to a different year from the original calibration.

Correctly, the procedure entails deducting the positions saved and other units saved from the original totals, as well as deducting the saved buses, hours, miles, and passenger boardings. If a policy exists not to lay off some of the positions indicated in the cost-savings calculation, then the amount of change will be considerably more dramatic. However, if adjustment is made for positions saved, it is expected that the internal recalibration will largely affect only the allocation of fixed costs.

3. APPLICATION OF THE PROCEDURES

3.1 INTERNAL RECALIBRATION OF THE COST MODEL

The change in the Consumer Price Index (CPI) from the end of FY 1984 to the middle of FY 1986, based on Bureau of Labor Statistics monthly releases, was 4.6%. Table 3-1 shows the FY 1984, FY 1985, and FY 1986 (projected) values of the level-of-service variables used in the cost model, and also shows the final audited values for FY 1984 (the calibration was done with actual data for the first three quarters of FY 1984 and projected data for the last quarter). It should be noted that it does not affect the recalibration whether vehicle hours and vehicle miles are expressed as revenue values, scheduled, total, or any other variant, as long as it is known which are used and that the model is applied always with values consistent with the model calibration or recalibration.

TABLE 3-1

ACTUAL AND PROJECTED ANNUAL LEVELS OF SERVICE FOR FY 1984, FY 1985, AND FY 1986

VARIABLE	VALUE			
	FY 1984 (CALIBRATED)	FY 1985 (ACTUAL)	FY 1986 (ESTIMATED)	FY 1984 (AUDITED)
P.M. Peak Buses	2,063	2,009	1,987	1,992
Vehicle Hours	7,152,000	7,041,642	7,585,000*	7,062,585
Vehicle Miles	95,122,000	91,959,736	107,465,000*	93,031,164
Passengers	465,400,000	497,158,321	424,400,000	465,637,732

* These are total miles and hours, while all other entries are revenue miles and hours.

Table 3-2 shows the budgets for FY 1984 for each service-level variable and for each type of variation. The Table also shows, for reference, the unit costs as derived for FY 1984. The CPI adjustment is then applied to determine the FY 1985 escalated budget, as shown, and the budget values are then divided by the FY 1985 service-level values to obtain new unit costs. These latter two items are shown in Table 3-2 as the escalated budget and the recalibrated unit costs. The same two calculations are also shown for FY 1986, for which the CPI change from FY 1984 was determined to be 11.285 percent.

TABLE 3-2

COMPUTATION OF RECALIBRATED COSTS AND ESCALATED BUDGETS

VARIABLE	TYPE	FY 1984 UNIT COST ($)	FY 1984 BUDGET ($000)	FY 1985 BUDGET ($000)	FY 1985 UNIT COST ($)	FY 1986 BUDGET ($000)	FY 1986 UNIT COST ($)
Peak Buses	Direct	79.01	163.0	170.3	82.57	181.4	87.93
	Fixed	33,279.69	68,656.0	71,745.5	35,712.06	76,403.8	38,451.85
	Step	22,497.33	46,412.0	48,500.5	24,141.63	51,649.6	25,993.76
	SUBTOTAL	55,856.03	115,231.0	120,412.0	59,936.26	128,228.0	64,533.54
Veh. Hours	Fixed	0.59	4,250.0	4,441.3	0.63	4,729.6	0.62
	Step	23.80	170,185.0	177,843.3	25.26	189,390.4	24.97
	SUBTOTAL	24.39	174,435.0	182,285.0	25.89	194,120.0	25.59
Veh. Miles	Direct	0.57	54,491.0	56,943.1	0.60	60,640.3	0.64
	Step	0.49	46,644.0	48,743.0	0.53	51,907.8	0.48
	SUBTOTAL	1.06	101,135.0	103,785.0	1.13	120,415.0	1.12
Pass. Bdgs.	Direct	0.0011	490.0	512.1	0.0011	545.3	0.0012
	Fixed	0.01	4,078.0	4,261.5	0.0086	4,538.2	0.0107
	Step	0.06	30,065.0	31,417.9	0.06	33,457.8	0.0788
	SUBTOTAL	0.0711	34,633.0	36,245.0	0.0729	38,493.0	0.0907
TOTAL COST/BUDGET			$425,434,000	$442,727,000		$481,256,000	

As can be seen from Table 3-2, the result of the test is that the model projects a total expenditure of $442,727,000 for FY 1985. The actual audited expenditures on operating budget for FY 1985 were $439,903,899. The difference (overestimate) of $2,823,101 represents 0.64 percent of the FY 1985 actual expenditures. The same process for the FY 1986

estimated budget, using the FY 1986 estimated service level data employed earlier to recalibrate the model, provides budget lines and coefficients that generate a total forecast budget of $481,256,000. This compares to the District budget of $484,174,000. In this case, the difference (underestimate) is $2,918,000 and represents 0.60 percent of the District budget for FY 1986.

Table 3-3 summarizes the final coefficients from Table 3-2 for the four service-level variables. There is some shifting of cost between the service-level variables resulting from some internal reorganization of the District between FY 1984 and FY 1986. As a result, the match between the internally recalibrated figures and the actual calibration of FY 1986 is not as close as the overall budget projections would indicate. However, the results are encouraging in terms of the robustness of the model and the ability of the internal recalibration to produce sensible results.

TABLE 3-3

SUMMARY OF FINAL COEFFICIENTS FROM INTERNAL RECALIBRATION AND FULL CALIBRATION OF FY 1986

VARIABLE	COEFFICIENT/UNIT COST ($)			
	FY 1984 Calibrated	FY 1985 Internally Recalibrated	FY 1986 Internally Recalibrated	FY 1986 Calibrated
Peak Buses	55,969	59,936	64,534	68,088
Vehicle Hours	24.390	25.887	25.593	25.82
Vehicle Miles	1.063	1.129	1.121	0.97
Passengers	0.0744	0.0729	0.0907	0.1162

3.2 DIRECT MODEL APPLICATION WITHOUT RECALIBRATION

A number of service cuts were identified by District Planning Staff, intended to total to a package of $10,000,000 in operating cost cuts for a full year, based on FY 1986 costs. These service cuts were costed originally using a version of the Scatchard model that has been adjusted to approximate marginal costs. Figure 3-1 shows an example of the spreadsheet used to compute a cost for a period of service on a line, using the FY 1986 calibrated model (from Technical Memorandum 86.5.1). Table 3-4 summarizes the calculations for each line or period on a line

and compares these with the Planning Department cost estimates. It must be emphasized that the costs in Table 3-4 do not reflect the potential savings within a division or across the entire District that would be achieved as the service cuts are summed together. The total effects are summarized at the end of the Table.

From these data, it is clear that the GPC Bus Operating Cost Model differs from the existing SCRTD cost model in that the full set of proposed service reductions are costed out at $7,913,600 instead of the $10,407,000 derived from the current SCRTD model. The GPC model estimate is approximately 24 percent lower than the Scatchard model. It is also clear from the table that there are significant intra-Division and Systemwide economies possible in a package of service changes of this size, given that the difference between the line-by-line costs and the division/systemwide costs is about $1.5 million in a set of service changes initially costed at $6.4 million. Gross costs of these service changes are $10,412,900, with revenues of $2,499,200.

The second notable element of the GPC Cost Model is shown in Table 3-5. This Table shows the sources of the costs identified in Table 3-4 and indicates the amount of cost attributable to each element. Of the gross costs for the service changes listed in these tables, approximately $2.8 million is derived from materials savings, such as fuel and parts, and from savings on property damage and public liability. These savings would be achieved without any other action on the part of the District than cutting the service. All of the remaining $7.6 million in costs are from labor positions or labor-related costs. For example, $6.1 million in savings will accrue from the 144 operators used to operate the services in Table 3-4. However, if these operators are not laid off, only a small fraction of the savings will occur from reductions in hours paid.

3.3 MODEL APPLICATION WITH RECALIBRATION

To determine the effects of internal recalibration of the model for a significant set of service changes, the changes used in the preceding section were re-estimated using a single recalibration for the entire package. Clearly, the primary effects of internal recalibration will be on the fixed costs, which were not included in the estimation of the service-change costs in Section 3.2. However, some changes may occur in step sizes as a result of the service changes. These can be identified readily by using Table 3-5, which indicates those line items that are changed and effectively identifies all unchanged labor categories.

The internal recalibration undertaken was done by recomputing each stepwise line item in the spreadsheets, determining the change in FY 1986 cost, the change in the base, and the change in the number of positions. These produced a new estimated step size for all steps. Using these new step sizes in the calculations for the division and systemwide costs of the service changes produced a revised estimate of net costs of $8,061,900, an increase of $148,300, or 2 percent of the original cost estimate. Based on this, it appears that internal recalibration of the model is unnecessary, at least for service changes on the order of 50 peak buses, and $10 million in gross costs.

TABLE 3-4

SUMMARY OF COSTS FOR SPECIFIC LINE AND PERIOD SERVICE CUTS, BASED ON THE FY 1986 GPC OPERATING COST MODEL

Line No.	Div. No.	Service Day	GPC Operating Cost	Cumulative GPC Cost	Scatchard Op. Cost	Cumulative Scatchard Cost
203	3	Weekday	$48,400	$48,400	$98,000	$98,000
203	3	Saturday	1,000	49,400	19,000	117,000
203	3	Sunday	1,100	50,500	21,000	138,000
203	3	All	94,100	94,100	138,000	138,000
225/226	18	Saturday	134,400	228,500	233,000	371,000
208	3	Sunday	25,700	254,200	34,000	405,000
175	3	Saturday	24,200	278,400	55,000	460,000
175	3	Sunday	800	279,200	30,000	490,000
175	3	Sat/Sun	46,000	300,200	85,000	490,000
208	3	Saturday	23,000	323,200	29,000	519,000
192/194	16	Weekday	427,700	750,900	636,000	1,155,000
250/253	10	Sunday	21,600	772,500	52,000	1,207,000
430	6	Weekday	44,400	816,900	83,000	1,290,000
130	12	Sunday	64,300	881,200	151,000	1,441,000
259	9	Sunday	42,100	923,300	103,000	1,544,000
236	8	Sunday	21,600	944,900	63,000	1,607,000
161	8	Weekday	181,600	1,126,500	333,000	1,940,000
205	12	Saturday	56,200	1,182,700	130,000	2,070,000
205	12	Sunday	14,500	1,197,200	52,000	2,122,000
205	12	Sat/Sun	70,700	1,197,200	182,000	2,122,000
220	7	Sunday	40,800	1,238,000	91,000	2,213,000
487/491	9	Saturday	85,800	1,323,800	168,000	2,381,000
487/491	9	Sunday	40,100	1,363,900	115,000	2,496,000
487/491	9	Sat/Sun	132,700	1,370,700	283,000	2,496,000
166/168	8	Sunday	42,300	1,413,000	129,000	2,625,000
208	3	Weekday	190,300	1,603,300	137,000	2,762,000
208	3	All	242,400	1,606,700	200,000	2,762,000
462	1	Sunday	41,400	1,648,100	92,000	2,854,000
236	8	Saturday	41,900	1,690,000	103,000	2,957,000
236	8	Sat/Sun	84,500	1,711,000	166,000	2,957,000
293	16	Weekday	454,100	2,165,100	255,000	3,212,000
262	9	Sunday	38,800	2,203,900	114,000	3,326,000
225/226	18	Weekday	769,700	2,973,600	1,126,000	4,452,000
225/226	18	All	968,400	3,037,900	1,359,000	4,452,000
268	3	Sunday	39,900	3,077,800	97,000	4,549,000
130	12	Saturday	59,300	3,137,100	130,000	4,679,000
130	12	Sat/Sun	148,400	3,161,900	281,000	4,679,000
250/253	10	Saturday	36,900	3,198,800	82,000	4,761,000
250/253	10	Sat/Sun	79,600	3,219,900	134,000	4,761,000
271	12	Weekday	164,900	3,384,800	299,000	5,060,000

TABLE 3-4 (Continued)

SUMMARY OF COSTS FOR SPECIFIC LINE AND PERIOD SERVICE CUTS, BASED ON THE FY 1986 GPC OPERATING COST MODEL

Line No.	Div. No.	Service Day	GPC Operating Cost	Cumulative GPC Cost	Scatchard Op. Cost	Cumulative Scatchard Cost
147	12	Saturday	$16,800	$3,401,600	$44,000	$5,104,000
147	12	Sunday	(4,900)	3,396,700	23,000	5,127,000
147	12	Sat/Sun	33,000	3,417,800	67,000	5,127,000
488	9	Sunday	18,000	3,435,800	54,000	5,181,000
274/276	9	Weekday	495,200	3,931,000	767,000	5,948,000
42	18	Sunday	99,600	4,030,600	203,000	6,151,000
259	9	Saturday	37,100	4,067,700	88,000	6,239,000
259	9	Sat/Sun	100,200	4,088,700	191,000	6,239,000
434	6	Sunday	83,200	4,171,900	198,000	6,437,000
220	7	Saturday	36,500	4,208,400	77,000	6,514,000
220	7	Sat/Sun	77,300	4,208,400	168,000	6,514,000
482	16	Sunday	38,200	4,246,600	123,000	6,637,000
267	9	Sunday	17,500	4,264,100	63,000	6,700,000
209	5	Sunday	54,200	4,318,300	110,000	6,810,000
493	9	Sunday	17,900	4,336,200	36,000	6,846,000
215	18	Saturday	15,900	4,352,100	57,000	6,903,000
262	9	Saturday	54,800	4,406,900	100,000	7,003,000
262	9	Sat/Sun	118,400	4,431,700	214,000	7,003,000
434	6	Saturday	79,500	4,511,200	174,000	7,177,000
434	6	Sat/Sun	180,700	4,529,200	372,000	7,177,000
158	15	Sunday	17,200	4,546,400	71,000	7,248,000
154	8	Sunday	36,200	4,582,600	86,000	7,334,000
183	15	Sunday	35,400	4,618,000	68,000	7,402,000
169	15	Saturday	35,400	4,653,400	100,000	7,502,000
423	8	Weekday	88,000	4,741,400	223,000	7,725,000
119/126	18	Saturday	52,100	4,793,500	108,000	7,833,000
438	18	Weekday	96,300	4,889,800	197,000	8,030,000
265/275	12	Weekday	374,400	5,264,200	588,000	8,618,000
211	5	Saturday	14,100	5,278,300	56,000	8,674,000
434	6	Weekday	638,400	5,916,700	993,000	9,667,000
434	6	All	883,600	5,981,200	1,365,000	9,667,000
256	10	Sunday	31,400	6,012,600	95,000	9,762,000
103	5	Sunday	14,900	6,027,500	44,000	9,806,000
255	10	Sunday	32,200	6,059,700	66,000	9,872,000
576	10	Weekday	361,500	6,421,200	535,000	10,407,000

TABLE 3-4 (Continued)

SUMMARY OF COSTS FOR SPECIFIC LINE AND PERIOD SERVICE CUTS, BASED ON THE FY 1986 GPC OPERATING COST MODEL

Line No.	Div. No.	Service Day	GPC Operating Cost	Cumulative GPC Cost	Scatchard Op. Cost	Cumulative Scatchard Cost
Systemwide Costs			$3,423,100			
			Division Costs:			
Division	1		25,100			
	3		349,800			
	5		69,400			
	6		479,100			
	7		48,200			
	8		333,800			
	9		685,500			
	10		319,200			
	12		603,700			
	15		62,000			
	16		687,500			
	18		827,200			
TOTAL (Systemwide and Division)				$7,913,600		

TABLE 3-5

SOURCES OF COSTS FOR THE SERVICE CHANGES IN TABLE 3-4

SOURCE LEVEL	DEPARTMENT	ITEM	QUANTITY	ALLOCATED COST
Systemwide	Facilities Maintenance	Supplies -- Radios	52	$3,926
	Scheduling	Schedule Checkers	1	42,645
	Facilities Maintenance	Electronics Maint.	1	39,928
	Maintenance Oper. Div.	Non-Revenue Maint.	1	34,400
	Maintenance Oper. Div.	Parts, Lubricants	-	1,030,705
	Non-Departmental Exp.	Fuel and Taxes	-	1,177,723
	Non-Departmental Exp.	Workmen's Comp. Maint	62	229,999
	Non-Departmental Exp.	Exp. & Provisions PD	40**	122,200
	Central Maintenance	Running Repair Mech.	1	40,179
	Central Maintenance	Mechanical Maint.Mech.	1	40,189
	Central Maintenance	Electrical Maint.Mech.	1	40,206
	Central Maintenance	Body Shop Mechanic	1	40,187
	Central Maintenance	Transmission Mechanic	1	40,200
	Central Maintenance	Engine Line Mechanic	1	39,983
	Print Shop	Timetable Printing	-	5,769
	Non-Departmental Exp.	Expenses for PL	31**	16,239
	Non-Departmental Exp.	Provisions for PL	31**	448,904
	Customer Relations	Telephone Clerks	1	29,678
Division 1	Transp. Oper. Division	Operators	1*	38,766
	Non-Depart. Expenses	Workmen's Comp. Oper.	1*	3,363
Division 3	Transp. Oper. Division	Operators	9*	348,897
	Non-Departmental Exp.	Workmen's Comp. Oper.	9*	30,263
	Maint. Oper. Division	Running Repairs Mech.	1	40,186
Division 5	Transp. Oper. Division	Operators	3*	116,299
	Non-Depart. Expenses	Workmen's Comp. Oper.	3*	10,088
Division 6	Maint. Oper. Division	Service Workers	1	31,945
	Transp. Oper. Division	Operators	18*	697,794
	Non-Departmental Exp.	Workmen's Comp. Oper.	18*	60,525
	Maint. Oper. Division	Running Repairs Mech.	3	120,559
Division 7	Transp. Oper. Division	Operators	2*	77,533
	Non-Depart. Expenses	Workmen's Comp. Oper.	2*	6,725
Division 8	Transp. Oper. Division	Operators	11*	426,430
	Non-Departmental Exp.	Workmen's Comp. Oper.	11*	36,988
	Maint. Oper. Division	Running Repairs Mech.	2	80,373

* Full-Time Equivalent positions
** Number of accidents involving property damage (average)

TABLE 3-5 (Continued)

SOURCES OF COSTS FOR THE SERVICE CHANGES IN TABLE 3-4

SOURCE LEVEL	DEPARTMENT	ITEM	QUANTITY	ALLOCATED COST
Division 9	Transp. Oper. Division	Operators	22.5*	$872,243
	Non-Departmental Exp.	Workmen's Comp. Oper.	22.5*	75,657
	Maint. Oper. Division	Running Repairs Mech.	3	120,559
Division 10	Maint. Oper. Division	Service Workers	1	31,945
	Transp. Oper. Division	Operators	12*	465,196
	Non-Departmental Exp.	Workmen's Comp. Oper.	12*	40,350
	Maint. Oper. Division	Running Repairs Mech.	1	40,186
Division 12	Maint. Oper. Division	Service Workers	1	31,945
	Transp. Oper. Division	Operators	19.5*	755,944
	Non-Departmental Exp.	Workmen's Comp. Oper.	19.5*	65,569
	Maint. Oper. Division	Running Repairs Mech.	3	120,559
Division 15	Transp. Oper. Division	Operators	3*	116,299
	Non-Depart. Expenses	Workmen's Comp. Oper.	3*	10,088
Division 16	Maint. Oper. Division	Service Workers	1	31,945
	Transp. Oper. Division	Operators	18*	697,794
	Non-Departmental Exp.	Workmen's Comp. Oper.	18*	60,525
	Maint. Oper. Division	Running Repairs Mech.	2	80,373
Division 18	Maint. Oper. Division	Service Workers	1	31,945
	Transp. Oper. Division	Operators	25*	969,159
	Non-Departmental Exp.	Workmen's Comp. Oper.	25*	84,063
	Maint. Oper. Division	Running Repairs Mech.	4	160,745

* Full-Time Equivalent positions
** Number of accidents involving property damage (average)

4. SPREADSHEETS FOR USING THE GPC BUS OPERATING COST MODEL

4.1 APPLEWORKS SPREADSHEETS

Appendix A shows three sample spreadsheets, one for a line and period, one for a division, and one for the system. These spreadsheets are currently being run on Apple //e computers under Appleworks, but an integrated database and spreadsheet system is under development in LOTUS 1-2-3 for use on IBM-PCs. The mechanics of the spreadsheets are little different. In the Appleworks version, the user follows the steps at the top of the sheet, entering only the line and division identifiers, as appropriate; adjusting the annual expansion factors, if necessary; and entering average data for the day or days defined for costing (i.e., an average weekday, an average Saturday, or an average Sunday). Recalculation of the spreadsheet is set to be done manually, not automatically, so the user must then request recalculation of the sheet, which produces the estimates of the Total Marginal Costs and the Net Total Marginal Costs.

If costs are desired for different periods of operation of the same line, service data can be entered for all periods of interest and the calculations controlled by means of the Period Designator (Step 1). The only exception to this is for a case where first one period, then two periods, and finally three periods are to be costed. In this case, it is necessary to wait until after the two periods have been run, before entering the data for the third period.

The spreadsheet calculates the annual service statistics from the daily ones provided by the user and also sums the total across periods, if more than one period of data is specified. Keyed to the Period Designator, the appropriate annual service statistic is then displayed before each of the four groups of cost calculations, i.e., buses, hours, miles, and passengers. The number of steps is then calculated for each stepwise line item and the costs are computed. These are summed and entered into the summary table, where the total costs are determined.

After completing all cost estimates by line and period, the data should be entered into the division spreadsheets for as many divisions as necessary. The division spreadsheets compute only the component of cost that is incurred within a division. To complete the estimation, even if only one division is involved, total service-level statistics should be entered into the systemwide spreadsheet, where the remaining variable costs are estimated at a systemwide level. The systemwide spreadsheet also permits the user to estimate both marginal and fully-allocated costs by toggling the "Fully-alloc." switch between 1 and 0.

4.2 LOTUS 1-2-3 SPREADSHEETS

At the time of preparation of this Technical Memorandum, an enhanced spreadsheet and database procedure is under development. This procedure will use a data base developed from a mainframe file containing all scheduled trips by all routes and from all divisions, together with the most recent available data on revenue and passenger boardings. The spreadsheet-database system, which runs on an IBM or compatible personal computer in LOTUS 1-2-3, is designed so that the user is asked to indicate only the line and period for which costs are to be estimated. After the first line and period is entered, the program asks the user if more lines or periods are to be costed. As each additional line or period is entered, data are accumulated by division and for the system. At any time that the user wishes to do so, estimates can be obtained of the total costs, for all lines and periods entered so far, including divisional and systemwide economies.

A Users Manual and description of the procedures will be prepared once the procedures are complete, together with a Technical Memorandum describing the methods to update the data bases.

A P P E N D I X A

SAMPLE SPREADSHEETS FOR LINE, DIVISION, AND SYSTEMWIDE COSTS

STEP 1: Enter period for computation of line costs
Weekday = 1, Saturday = 2, Sunday = 3, Total = 4
NOTE: If a combination of ANY TWO periods is desired, enter 4 for period.
Then enter DAILY STATISTICS for desired TWO periods in Step 4
STEP 2: Enter Line Number and Division Number
STEP 3: Are the number of days in the year correct for this line?
If NO, change entries in in 'Numbers of Days' cells
STEP 4: Enter DAILY STATISTICS for the periods to be used in
calculating line costs

Period	4	Number of Days:	Weekdays	255
Line Number	208		Saturday	52
Division Num	3		Sundays	58

	Weekday		Saturday		Sunday		
Days in Year		255		52		58	TOTAL
SOURCE	Daily	Annual	Daily	Annual	Daily	Annual	ANNUAL
Peak Buses	1						1
Vehicle Hrs.	24.0	6,120	17.0	884	17.0	986	7,990
Vehicle Mls.	483	123,165	216	11,232	241	13,978	148,375
Passengers	358	91,290	235	12,220	146	8,468	111,978
Passenger Revenue	$104	$26,520	$73	$3,796	$47	$2,726	$33,042

COST CALCULATIONS BY SOURCE - LINE 208 DIVISION 3

Buses 1

Type	FY 1986 Cost	FY 1986 Base	Step Basis	Step Size	No. of Steps	Step Cost	Annual Cost	Department	Item
Direct	$150,000	1987	1987	1.0	1	$75	$75	Facilities Maint.	Supplies -- Radio
Step D	$10,944,000	1987	343	5.8	0	$31,907	$0	Maint. Oper. Div.	Servicing Mechanics
Step S	$2,690,000	1987	63	31.5	0	$42,698	$0	Scheduling	Scheduling Checkers
Step D	$1,913,000	1987	60	33.1	0	$31,883	$0	Maint. Oper. Div.	Servicing Deep Clean Wk
Step D	$2,412,000	1987	60	33.1	0	$40,200	$0	Maint. Oper. Div.	Wheelchair Maint. Mecha
Step S	$1,688,000	1987	42	47.3	0	$40,190	$0	Facilities Maint.	Electronic Maint. Mecha
Step D	$1,326,000	1987	33	60.2	0	$40,182	$0	Maint. Oper. Div.	Farebox Maint. Mechanic
Step D	$723,000	1987	18	110.4	0	$40,167	$0	Maint. Oper. Div.	Special Projects Mechan
Step S	$544,000	1987	17	116.9	0	$32,000	$0	Central Maint.	Service Workers
Step S	$3,861,000	1987	14	141.9	0	$275,786	$0	Facilities Maint.	Electrical, Property, S
Step S	$702,000	1987	14	141.9	0	$50,143	$0	Maintenance Gen.	Maintenance Instructors
Step D	$9,742,000	1987	13	152.8	0	$749,385	$0	Transp. Oper. Div.	All except Operators
Step S	$573,000	1987	13	152.8	0	$44,077	$0	Transp. Services	Radio Dispatchers
Step D	$1,258,000	1987	13	152.8	0	$96,769	$0	Purchasing	Division Storekeepers
Step D	$9,476,000	1987	13	152.8	0	$728,923	$0	Maint. Oper. Div.	Misc., Supp., Admin.,Su
Step S	$574,000	1987	12	165.6	0	$47,833	$0	Central Maint.	Central Shop Supervisio
Total	$48,576,000						$75		

Hours 7,990

Type	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Step D	$172,358,000	7585000	8890	853	9	$19,388	$174,491	Transp. Oper. Div.	Operators
Step D	$14,950,000	7585000	8890	853	9	$1,682	$15,135	Non-Dept. Expenses	Workmen's Comp.--Operat
Step S	$1,204,000	7585000	35	216714	0	$34,400	$0	Maint. Oper. Div.	Non-Revenue Maintenance
Step S	$967,000	7585000	23	329783	0	$42,043	$0	Scheduling	Schedule Makers
Step S	$792,000	7585000	18	421389	0	$44,000	$0	Transp. Services	Street Supervisors
Step S	$586,000	7585000	17	446176	0	$34,471	$0	Transit Police	Transp. Service Inspec.
Step S	$708,000	7585000	16	474062	0	$44,250	$0	Transp. Instruct.	Operator Training
Step S	$373,000	7585000	12	632083	0	$31,083	$0	Account. & Fiscal	Payroll Clerks
Total	$191,938,000						$189,626		

Miles 148,375

Type	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Direct	$25,421,000	107465000	107465000	1	148375	$.2366	$35,098	Maint. Oper. Div.	Parts, lubricants, etc.
Direct	$29,047,000	107465000	107465000	1	148375	$.2703	$40,105	Non-Dept. Expenses	Fuel and Taxes on Fuel
Step S	$5,750,000	107465000	1550	69332	2	$3,710	$7,419	Non-Dept. Expenses	Workmen's Comp.
Step S	$3,055,000	107465000	1000	107465	1	$3,055	$3,055	Non-Dept. Expenses	Expen. and Prov. for PD
Step D	$24,152,000	107465000	601	178810	0	$40,186	$0	Maint. Oper. Div.	Running Repair Mechanic
Step D	$2,009,000	107465000	50	2149300	0	$40,180	$0	Maint. Oper. Div.	Inspectors
Step S	$1,567,000	107465000	39	2755513	0	$40,179	$0	Central Maint.	Running Repair Mechanic
Step S	$1,487,000	107465000	37	2904459	0	$40,189	$0	Central Maint.	Mechanical Maint. Worke
Step S	$1,367,000	107465000	34	3160735	0	$40,206	$0	Central Maint.	Electrical Maint. Worke
Step S	$1,286,000	107465000	32	3358281	0	$40,188	$0	Central Maint.	Body Shop Mechanics
Step S	$1,206,000	107465000	30	3582167	0	$40,200	$0	Central Maint.	Transmission Mechanics
Step S	$1,085,000	107465000	27	3980185	0	$40,185	$0	Central Maint.	Engine Line Mechanics
Step S	$965,000	107465000	24	4477708	0	$40,208	$0	Central Maint.	Welding Mechanics
Step S	$763,000	107465000	19	5656053	0	$40,158	$0	Central Maint.	Cylinder Head Mechanics
Step S	$763,000	107465000	19	5656053	0	$40,158	$0	Central Maint.	Paint Shop Workers
Step S	$563,000	107465000	14	7676071	0	$40,214	$0	Central Maint.	Machine Shop Mechanics
Step S	$563,000	107465000	14	7676071	0	$40,214	$0	Central Maint.	Sheet Metal Shop Mechan
Step S	$523,000	107465000	13	8266538	0	$40,231	$0	Central Maint.	Frame Shop Mechanics
Step S	$523,000	107465000	13	8266538	0	$40,231	$0	Central Maint.	Upholstery Workers
Step S	$442,000	107465000	11	9769545	0	$40,182	$0	Central Maint.	Systems Shop Mechanics
Step S	$321,000	107465000	8	13433125	0	$40,125	$0	Central Maint.	Engine Parts Crib Mecha
Step S	$321,000	107465000	8	13433125	0	$40,125	$0	Central Maint.	Engine Teardown Mechani
Step D	$241,000	107465000	6	17910833	0	$40,167	$0	Maint. Oper. Div.	Road Failure Mechanics
Step S	$201,000	107465000	5	21493000	0	$40,200	$0	Central Maint.	Sign Shop Mechanics
Step S	$161,000	107465000	4	26866250	0	$40,250	$0	Central Maint.	Tool & Unit Room Mechan
Total	$103,782,000						$85,677		

Passengers 111,978

Type	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Direct	$476,000	424400000	424400000	1	111978	$0	$126	Print Shop	Timetables
Step S	$1,362,000	424400000	2600	163231	0	$524	$0	Non-Dept. Expenses	Expenses for PL
Step S	$37,650,000	424400000	2600	163231	0	$14,481	$0	Non-Dept. Expenses	Provisions for Unins. P
Step S	$2,671,000	424400000	90	4715556	0	$29,678	$0	Customer Relations	Telephone Clerks
Step S	$1,172,000	424400000	34	12482353	0	$34,471	$0	Transit Police	Police--Passenger Secur
Step S	$1,065,000	424400000	33	12860606	0	$32,273	$0	Account. & Fiscal	Cash Clerks
Step S	$681,000	424400000	22	19290909	0	$30,955	$0	Marketing and Comm.	Ticket Clerks
Total	$45,077,000						$126		

SUMMARY COST TABLE

Source	Value
Peak Buses	$75
Vehicle Hours	$189,626
Vehicle Miles	$85,677
Passenger Boardings	$126
TOTAL MARGINAL COSTS	$275,504
Passenger Revenue	$33,042
NET TOTAL MARGINAL COSTS	$242,462

STEP 1: Enter period for computation of line costs
Weekday = 1, Saturday = 2, Sunday = 3, Total = 4
NOTE: If a combination of ANY TWO periods is desired, enter 4 for period.
Then enter DAILY STATISTICS for desired TWO periods in Step 4
STEP 2: Enter Line Number and Division Number
STEP 3: Are the number of days in the year correct for this line?
If NO, change entries in in "Numbers of Days" cells
STEP 4: Enter DAILY STATISTICS for the periods to be used in
calculating line costs

Period	4	Number of Days:	Weekdays	255
Line Number	0		Saturday	52
Division Num	3		Sundays	58

	Weekday		Saturday		Sunday		
Days in Year	255		52		58		TOTAL
SOURCE	Daily	Annual	Daily	Annual	Daily	Annual	ANNUAL
Peak Buses	2						2
Vehicle Hrs.	34.4	8,772	53.7	2,792	79.4	4,605	16,170
Vehicle Mls.	566	144,330	613	31,876	1,143	66,294	242,500
Passengers	391	99,705	577	30,004	1,267	73,486	203,195
Passenger Revenue	$116	$29,580	$196	$10,192	$514	$29,812	$69,584

COST CALCULATIONS BY SOURCE - LINE 0 DIVISION 3

Buses 2

Type	FY 1986 Cost	FY 1986 Base	Step Basis	Step Size	No. of Steps	Step Cost	Annual Cost	Department	Item
Step D	$10,944,000	1987	343	5.8	0	$31,907	$0	Maint. Oper. Div.	Servicing Mechanics
Step D	$1,913,000	1987	60	33.1	0	$31,883	$0	Maint. Oper. Div.	Servicing Deep Clean
Step D	$2,412,000	1987	60	33.1	0	$40,200	$0	Maint. Oper. Div.	Wheelchair Maint. Mec
Step D	$1,326,000	1987	33	60.2	0	$40,182	$0	Maint. Oper. Div.	Farebox Maint. Mechan
Step D	$723,000	1987	18	110.4	0	$40,167	$0	Maint. Oper. Div.	Special Projects Mech
Step D	$9,742,000	1987	13	152.8	0	$749,385	$0	Transp. Oper. Div.	All except Operators
Step D	$1,258,000	1987	13	152.8	0	$96,769	$0	Purchasing	Division Storekeepers
Step D	$9,476,000	1987	13	152.8	0	$728,923	$0	Maint. Oper. Div.	Misc., Supp., Admin.,
Total	$37,794,000						$0		

Hours 16,170

Type	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Step D	$172,358,000	7585000	8890	853	18	$19,388	$348,981	Transp. Oper. Div.	Operators
Step D	$14,950,000	7585000	8890	853	18	$1,682	$30,270	Non-Dept. Expenses	Workmen's Comp.--Oper
Total	$187,308,000						$379,251		

Miles 242,500

Type	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Step D	$24,152,000	107465000	601	178810	1	$40,186	$40,186	Maint. Oper. Div.	Running Repair Mechan
Step D	$2,009,000	107465000	50	2149300	0	$40,180	$0	Maint. Oper. Div.	Inspectors
Step D	$241,000	107465000	6	17910833	0	$40,167	$0	Maint. Oper. Div.	Road Failure Mechanic
Total	$26,402,000						$40,186		

SUMMARY COST TABLE

Source	Value
Peak Buses	$0
Vehicle Hours	$379,251
Vehicle Miles	$40,186
TOTAL MARGINAL COSTS	$419,438
Passenger Revenue	$69,584
NET TOTAL MARGINAL COSTS	$349,854

STEP 1: Enter period for computation of line costs
Weekday = 1, Saturday = 2, Sunday = 3, Total = 4
NOTE: If a combination of ANY TWO periods is desired, enter 4 for period.
Then enter DAILY STATISTICS for desired TWO periods in S Step 4
STEP 2: Enter Line Number and Division Number
STEP 3: Are the number of days in the year correct for this line?
If NO, change entries in "Number of Days" cells
STEP 4: Enter DAILY STATISTICS for the periods to be used in
calculating line costs
STEP 5: If marginal costs are to be calculated, enter 0 against fully-allocated.
If fully-allocated costs are desired, enter 1 against fully-allocated.

Period	4	Number of Days:	Weekdays	255
Line Number	0		Saturdays	52
Division Num	0		Sundays	58
Fully-Alloc.	0			

	Weekday		Saturday		Sunday		
Days in Year		255		52		58	TOTAL
SOURCE	Daily	Annual	Daily	Annual	Daily	Annual	ANNUAL
Peak Buses	52						52
Vehicle Hrs.	597.4	152,337	792.7	41,220	1,004.4	58,255	251,813
Vehicle Mls.	10,911	2,782,305	12,590	654,680	15,866	920,228	4,357,213
Passengers	12,254	3,124,770	15,516	806,832	20,891	1,211,678	5,143,280
Passenger Revenue	$6,121	$1,560,855	$7,267	$377,884	$9,878	$572,924	$2,511,663

COST CALCULATIONS BY SOURCE - LINE 0 DIVISION 0

Buses 52

Type	FY 1986 Cost	FY 1986 Base	Step Basis	Step Size	No. of Steps	Step Cost	Annual Cost	Department	Item
Direct	$150,000	1987	1987	1.0	52	$75	$3,926	Facilities Maint.	Supplies -- Radi
Step S	$2,690,000	1987	63	31.5	1	$42,698	$42,698	Scheduling	Scheduling Check
Step S	$1,688,000	1987	42	47.3	1	$40,190	$40,190	Facilities Maint.	Electronic Maint
Step S	$544,000	1987	17	116.9	0	$32,000	$0	Central Maint.	Service Workers
Step S	$3,861,000	1987	14	141.9	0	$275,786	$0	Facilities Maint.	Electrical, Prop
Step S	$702,000	1987	14	141.9	0	$50,143	$0	Maintenance Gen.	Maintenance Inst
Step S	$573,000	1987	13	152.8	0	$44,077	$0	Transp. Services	Radio Dispatcher
Step S	$574,000	1987	12	165.6	0	$47,833	$0	Central Maint.	Central Shop Sup
Fixed	$86,714,000	1987	1987	1.0	52	$43,641	$2,269,315		
Total	$10,782,000						$86,814		

Hours 251812.6

Type	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Step S	$1,204,000	7585000	35	216714	1	$34,400	$34,400	Maint. Oper. Div.	Non-Revenue Main
Step S	$967,000	7585000	23	329783	0	$42,043	$0	Scheduling	Schedule Makers
Step S	$792,000	7585000	18	421389	0	$44,000	$0	Transp. Services	Street Supervisc
Step S	$586,000	7585000	17	446176	0	$34,471	$0	Transit Police	Transp. Service
Step S	$708,000	7585000	16	474062	0	$44,250	$0	Transp. Instruct.	Operator Trainin
Step S	$373,000	7585000	12	632083	0	$31,083	$0	Account. & Fiscal	Payroll Clerks
Fixed	$3,869,000	7585000	7585000	1	251812	$1	$128,446		
Total	$4,630,000						$34,400		

Miles 4,357,213

Type	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Direct	$25,421,000	107465000	107465000	1	4357213	$.2366	$1,030,705	Maint. Oper. Div.	Parts, lubricant
Direct	$29,047,000	107465000	107465000	1	4357213	$.2703	$1,177,723	Non-Dept. Expenses	Fuel and Taxes o
Step S	$5,750,000	107465000	1550	69332	62	$3,710	$230,000	Non-Dept. Expenses	Workmen's Comp.
Step S	$3,055,000	107465000	1000	107465	40	$3,055	$122,200	Non-Dept. Expenses	Expen. and Prov.
Step S	$1,567,000	107465000	39	2755513	1	$40,179	$40,179	Central Maint.	Running Repair M
Step S	$1,487,000	107465000	37	2904459	1	$40,189	$40,189	Central Maint.	Mechanical Maint
Step S	$1,367,000	107465000	34	3160735	1	$40,206	$40,206	Central Maint.	Electrical Maint
Step S	$1,286,000	107465000	32	3358281	1	$40,188	$40,188	Central Maint.	Body Shop Mechan
Step S	$1,206,000	107465000	30	3582167	1	$40,200	$40,200	Central Maint.	Transmission Mec
Step S	$1,085,000	107465000	27	3980185	1	$40,185	$40,185	Central Maint.	Engine Line Mech
Step S	$965,000	107465000	24	4477708	0	$40,208	$0	Central Maint.	Welding Mechanic
Step S	$763,000	107465000	19	5656053	0	$40,158	$0	Central Maint.	Cylinder Head Me
Step S	$763,000	107465000	19	5656053	0	$40,158	$0	Central Maint.	Paint Shop Worke
Step S	$563,000	107465000	14	7676071	0	$40,214	$0	Central Maint.	Machine Shop Mec
Step S	$563,000	107465000	14	7676071	0	$40,214	$0	Central Maint.	Sheet Metal Shop
Step S	$523,000	107465000	13	8266538	0	$40,231	$0	Central Maint.	Frame Shop Mecha
Step S	$523,000	107465000	13	8266538	0	$40,231	$0	Central Maint.	Upholstery Worke
Step S	$442,000	107465000	11	9769545	0	$40,182	$0	Central Maint.	Systems Shop Mec
Step S	$321,000	107465000	8	13433125	0	$40,125	$0	Central Maint.	Engine Parts Cri
Step S	$321,000	107465000	8	13433125	0	$40,125	$0	Central Maint.	Engine Teardown
Step S	$201,000	107465000	5	21493000	0	$40,200	$0	Central Maint.	Sign Shop Mechan
Step S	$161,000	107465000	4	26866250	0	$40,250	$0	Central Maint.	Tool & Unit Room
Total	$77,380,000						$2,801,775		

Passengers 5,143,280

Type	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Direct	$476,000	424400000	424400000	1	5143280	$0	$5,769	Print Shop	Timetables
Step S	$1,362,000	424400000	2600	163231	31	$524	$16,239	Non-Dept. Expenses	Expenses for PL
Step S	$37,650,000	424400000	2600	163231	31	$14,481	$448,904	Non-Dept. Expenses	Provisions for U
Step S	$2,671,000	424400000	90	4715556	1	$29,678	$29,678	Customer Relations	Telephone Clerks
Step S	$1,172,000	424400000	34	12482353	0	$34,471	$0	Transit Police	Police--Passenge
Step S	$1,065,000	424400000	33	12860606	0	$32,273	$0	Account. & Fiscal	Cash Clerks
Step S	$681,000	424400000	22	19290909	0	$30,955	$0	Marketing and Comm.	Ticket Clerks
Fixed	$4,218,000	424400000	424400000	1	5143280	$0	$51,118		
Total	$45,077,000						$500,589		

SUMMARY COST TABLE

Source	Value
Peak Buses	$86,814
Vehicle Hours	$34,400
Vehicle Miles	$2,801,775
Passenger Boardings	$500,589
TOTAL COSTS	$3,423,579

GENERAL PLANNING CONSULTANT

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M   M  EEEEE  M   M   000   RRRR    AAA   N   N  DDDD   U   U  M   M
MM MM  E      MM MM  0   0  R   R  A   A  NN  N  D   D  U   U  MM MM
M M M  EEE    M M M  0   0  RRRR   AAAAA  N N N  D   D  U   U  M M M
M   M  E      M   M  0   0  R  R   A   A  N  NN  D   D  U   U  M   M
M   M  EEEEE  M   M   000   R   R  A   A  N   N  DDDD    UUU   M   M
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To: Steve Parry

From: David Wilson

Date: April 9, 1986

Subject: BUS COST MODEL DATA BASE

Background:

As you know, we have been working to develop a data base of daily miles, hours and peak buses for each line by operating division. The 4-24 reports provide these data by line only and do not split miles and hours by division.

To obtain this information we have developed an algorithm to summarize this data from the bus run data base files (for September 8, 1985) provided by Dennis Shoemaker in scheduling.

Current Position:

The algorithm we have developed matches the results of the 4-24 reports for most records, however, these are some discrepancies between the records. Discussions with Dennis Shoemaker indicate two likely causes or sources for the discrepancies:

1. The 4-24 reports assume the evening peak hour is between 3.45pm and 7pm, whereas, our algorithm calculates buses in the peak between 3pm and 6pm. The margin of error usually involves ± 1 bus per line.

2. The 4-24 report assigns driver relief runs to the line which the bus operated prior to commencing the relief run. Our algorithm assigns the hours and miles to the division to which or from which the driver relief run is made. This effectively creates a pool of hours and miles that is assigned to a division but not a line.

Possible Directions To Proceed:

We believe that there is no reason to change the algorithm we use to calculate buses in the peak because the discrepancies are small and can be ignored.

However, a decision is needed on the procedure to be used to handle driver relief runs. There are 4 alternative techniques that may be used and each has advantages and disadvantages.

First the procedure used to generate the 4-24 reports could be used. This uses the assignment of miles and hours to the bus line number that happens to be used for the relief run. However this will overestimate the costs of running that line and underestimate the costs of running lines whose buses do not happen to be used for relief runs but whose drivers may be carried on the relief runs.

Alternatively if we use our algorithm which spreads the costs over the division then we are adding to the fixed or overhead costs of the division and by definition these will not be sensitive to changes in the amount of buses operated. Any reductions of buses would usually be associated with some reduction in the need for relief runs. Totally shutting down all lines in a division would still leave a residual of hours and miles associated with relief bus runs that were no longer needed.

A third and new method of allocation is to identify all the bus lines that come into a terminal and that use one of the buses for the relief run. The costs associated with the relief run could then be spread over all the bus lines that use the relief run. This is theoretically better, but this will require a more complex algorithm and consequently take more time to implement.

A fourth and final alternative is to take a combination of the second and third alternatives. For the purposes of implementing the cost model we can accept our existing algorithm (allocation to division) and continue to build the model but plan in fiscal '87 to revise the allocation procedure using the theoretically better third technique.

We request your advice and direction regarding which of the four alternatives we should proceed to implement.

CC Leo Bevon
Keith Killough
Anne Odell
Dennis Shoemaker
Peter Stopher
Project File (2 copies)

RTD 37-11
REV 5/82

DEPARTMENTAL

Keith Killough

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

DO NOT INCLUDE MORE THAN ONE SUBJECT IN THIS COMMUNICATION

DATE: June 19, 1986

TO: Section Managers

FROM: Stephen T. Parry

SUBJECT: BUS COST FORMULA

The General Planning Consultants have developed a version of the Bus Cost Model for our review and application. The result of several months of development, it is our intent to eventually replace the present cost formula with this. With that in mind, please have your staff work with it so we may see how it performs. As with any program, the bugs must be worked on.

A floppy disk of the program and two copies of the draft user documentation are for your section's use. Please appoint a contact person(s) for your section so we may keep the material current as new issues are released.

Mike Brewer will serve as the focal point for your comments, suggestions, and intermediary with the GPC staff.

Attachments

cc: Peter Stopher
Gary Spivack

Info Support

BUSCOST

VERSION 1.0

USER DOCUMENTATION

DRAFT

June, 1986

WHAT IS THE BUS COST MODEL?

The Bus Cost Model is designed to predict the annual operating cost of a bus line or group of lines. The model is based on the actual 1985/1986 operating budget and can be used to estimate the costs of running a bus line on a weekday or a Saturday or a Sunday or some combination.

Specifically the model can perform the following tasks:

1. Cost an existing bus line already in the data base
2. Cost a group of lines in the data base
3. Cost a proposed line where the level of service is supplied by the user.
4. Change the level of service of existing bus lines in the data base and then cost the results.

The cost model contains a large data base of existing RTD bus services so that the user only has to specify the bus line number and day of the week for the model to be able to calculate operating costs.

The cost model has been developed as a spreadsheet program using LOTUS 123. You do not have to know about the theory of the model or how to use spreadsheet programs like LOTUS in order to be able to run the program. This is because the Bus Cost Model is menu driven. All you have to do is learn to use a menu of functions which run the cost calculations for you and print reports.

However, should you want to come to grips with the theory of the Bus Cost Model then there are a number of technical documents that you could read. Technical Memoranda 5.1.2, June 1984, and 86.5.1 and 86.5.3 November 1985 and 86.5.2 February 1986 explain the theory and procedures used for calculating the model.

Different Costs.. Systemwide and Divisional.

As the name suggests the bus cost model estimates costs of operating a bus. These costs are estimated simply by taking each line item of the bus system budget (wages,maintenance,fuel etc.) and allocating them to one of four measures of how much work a bus performs.This is because the more work or services a bus produces the more it costs to operate. The measures of the work or level of service used are: the number of buses used in peak operations, the annual amount of miles and hours travelled and the number of passengers that boarded the bus. As these measures go up costs go up and as they go down costs go down.These measures have been found to be accurate predictors of bus costs.

The Bus Cost Model splits costs into divisional and systemwide costs. .

Cost of Operating A Bus

Divisional Systemwide

Certain functions of running a bus company can be located at a bus garage or divisional level. For example, daily or weekly maintenance takes place in the division. For savings to occur in maintenance there needs to be changes in the number of buses serviced by that division. In a multidivision operation cutting buses in several divisions may in fact create no saving because not enough buses have been removed from the division to warrant the saving of say a mechanic or bus driver.On the other hand some functions like central maintenance, administration and marketing are a function of the total bus fleet and changes can be pooled across all divisions. This is why bus costs are partitioned into division and systemwide costs. A more detailed description of the theory is contained in the technical reports.

SAMPLE OUTPUT

This section describes the columns of the systemwide and division spreadsheets. Recall that the bus cost model has two different calculation areas, one for system effects and another for divisional effects. The columns of each sheet are similar so it will suffice to detail the systemwide spreadsheet.

First let's consider the overall layout of the bus cost analysis printout. Figure 1 is a printout of the calculations for the system costs of a bus line (line 203). It shows all costs that cannot be easily or meaningfully allocated to any one division. For example, scheduling departments, central facilities maintenance, administration, and training, etc., are functions that must be be performed for the whole fleet and cannot easily be allocated to any one group or division of buses.

/C

BUS COST ANALYSIS MODEL
(GPC 1986)
V 1.1

DATE: 02-Jun-86

System wide calculations area

Totals:	peak buses	vehicle hours	vehicle miles	pass-pass	revenue dollars $
	0	10,400	52,000	52,000	104,000

Buses 0

Type	FY 1986 Cost $	FY 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $	Department	ITEM
Direct	150,000	1,987	1	0	75	0	Facilities Maint.	Supplies --Radio
Step S	2,690,000	1,987	32	0	42,645	0	Scheduling	Scheduling Checkers
Step S	1,688,000	1,987	47	0	39,928	0	Facilities Maint.	Electronic Maint. Mec.
Step S	544,000	1,987	117	0	32,032	0	Central Maint.	Service Workers
Step S	3,861,000	1,987	142	0	275,925	0	Facilities Maint.	Electrical, Prop
Step S	702,000	1,987	142	0	50,168	0	Maintenance Gen.	Maintenance Inst
Step S	573,000	1,987	153	0	44,121	0	Transp. Services	Radio Dispatcher
Step S	574,000	1,987	166	0	47,954	0	Central Maint.	Central Shop Sup
Fixed	86,714,000	1,987	1	0	43,641	0		
Total	10,782,000					0		

Hours 10,400

Type	Fy 1986 Cost $	Fy 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $		
Step S	1,204,000	7,585,000	216,714	0	34,400	0	Maint. Oper. Div.	Non-Revenue Main
Step S	967,000	7,585,000	329,783	0	42,044	0	Scheduling	Schedule Makers

Figure 2 shows the costs for the operating divisions. These costs (e.g., daily maintenance and driver wages) can be allocated by division.

COSTS FOR DIVISION 3

Buses 0

Type	FY 1986 Cost $	FY 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $	Department	
Step D	10,944,000	1,987	6	0	31,945	0	Maint. Oper. Div.	Servicing Mechanics
Step D	1,913,000	1,987	33	0	31,771	0	Maint. Oper. Div.	Servicing Deep Clean
Step D	2,412,000	1,987	33	0	40,180	0	Maint. Oper. Div.	Wheelchair Maint. Mec.
Step D	1,326,000	1,987	60	0	40,174	0	Maint. Oper. Div.	Farebox Maint. Mechan
Step D	723,000	1,987	110	0	40,025	0	Maint. Oper. Div.	Special Projects Mech.
Step D	9,742,000	1,987	153	0	750,139	0	Transp. Oper. Div.	All except Operators
Step D	1,258,000	1,987	153	0	96,867	0	Purchasing	Division Storekeepers
Step D	9,476,000	1,987	153	0	729,657	0	Maint. OPer. Div.	Misc., Supp., Admin.,
Total	37,794,000					0		

Hours 10,400

Type	Fy 1986 Cost $	Fy 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $		
Step D	172,358,000	7,585,000	853	12	19,383	232,596	Transp. Oper. Div.	Operators
Step D	14,950,000	7,585,000	853	12	1,681	20,172	Non-Dept. Expenses	Workmen's Comp. -Oper
Total	187,308,000					252,768		

miles 52,000

Type	Fy 1986 Cost $	Fy 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $		
Step D	24,152,000	107,465,000	178,810	0	40,186	0	Maint. Oper. Div.	Running Repair Mech.
Step D	2,009,000	107,465,000	2,149,300	0	40,180	0	Maint. Oper. Div.	Inspectors
Step D	241,000	107,465,000	17,910,833	0	40,167	0	Maint. Oper. Div.	Road Failure Mechanics
Total	26,402,000					0		

Step S	792,000	7,585,000	421,400	0	44,001	0	Transp. Services	Street Supervisor
Step S	586,000	7,585,000	446,176	0	34,471	0	Transit Police	Transp. Service
Step S	708,000	7,585,000	474,000	0	44,244	0	Transp. Instruct.	Operator training
Step S	373,000	7,585,000	632,083	0	31,083	0	Account. & Fiscal	Payroll Clerks
	3,869,000	7,855,000	1	236,731	1	236,731		
Total	4,630,000					271,131		

miles 2,580,520

Type	Fy 1986 Cost $	Fy 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $		
Direct	25,421,000	107,465,000	1	2,580,519	0.24	610,551	Maint. Oper. Div.	Parts, lubricant
Direct	29,047,000	107,465,000	1	2,580,519	0.27	697,514	Non-Dept. Expenses	Fuel and Taxes
Step S	5,750,000	107,465,000	69,332	37	3,710	137,270	Non-Dept. Expenses	Workmen's Comp.
Step S	3,055,000	107,465,000	107,465	24	3,055	73,320	Non-Dept. Expenses	Expen. and Prov.
Step S	1,567,000	107,465,000	2,755,513	0	40,179	0	Central Maint.	Running Repairs
Step S	1,487,000	107,465,000	2,904,459	0	40,189	0	Central Maint.	Mechanical Maint.
Step S	1,367,000	107,465,000	3,160,735	0	40,206	0	Central Maint.	Electrical Maint.
Step S	1,286,000	107,465,000	3,358,281	0	40,187	0	Central Maint.	Body Shop Mech.
Step S	1,206,000	107,465,000	3,582,167	0	40,200	0	Central Maint.	Transmission Mec.
Step S	1,085,000	107,465,000	3,960,185	0	39,983	0	Central Maint.	Engine Line Mech.
Step S	965,000	107,465,000	4,477,708	0	40,208	0	Central Maint.	Welding Mech.
Step S	763,000	107,465,000	5,656,053	0	40,158	0	Central Maint.	Cylinder Head Mech.
Step S	763,000	107,465,000	5,656,053	0	40,158	0	Central Maint.	Paint Shop Worker
Step S	563,000	107,465,000	7,676,071	0	40,214	0	Central Maint.	Machine Shop Mech.
Step S	563,000	107,465,000	7,676,071	0	40,214	0	Central Maint.	Sheet Metal Shop
Step S	523,000	107,465,000	8,266,538	0	40,213	0	Central Maint.	Frame Shop Mech.
Step S	523,000	107,465,000	8,266,538	0	40,213	0	Central Maint.	Upholstery Worker
Step S	442,000	107,465,000	9,769,545	0	40,182	0	Central Maint.	Systems Shop Mech.
Step S	321,000	107,465,000	13,433,125	0	40,125	0	Central Maint.	Engine Parts Cri
Step S	321,000	107,465,000	13,433,125	0	40,125	0	Central Maint.	Engine Teardown
Step S	201,000	107,465,000	21,493,000	0	40,200	0	Central Maint.	Sign Shop Mech.
Step S	161,000	107,465,000	26,866,250	0	40,250	0	Central Maint.	Tool & Unit Room
Total	77,380,000					1,518,655		

Passengers 16,713,895

Type	Fy 1986 Cost $	Fy 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $		
Direct	476,000	424,400,000	1	16,713,895	0	18,385	Print Shop	Timetables
Step S	1,352,000	424,400,000	163,231	102	524	53,448	Non-Dept. Expenses	Expenses for PL
Step S	37,650,000	424,400,000	163,231	102	14,481	1,477,062	Non-Dept. Expenses	Provisions for U

Step S	2,671,000	424,400,000	4,715,555	3	29,678	89,034	Customer Relations	Telephone Clerks
Step S	1,172,000	424,400,000	12,482,353	1	34,471	34,471	Transit Police	Police—Passenger
Step S	1,065,000	424,400,000	12,860,606	1	32,273	32,273	Account. & Fiscal	Cash Clerks
Step S	681,000	424,400,000	19,290,909	0	30,955	0	Marketing and Comm.	Ticket Clerks
Fixed	4,218,000	424,400,000	1	16,713,895	0	167,139		
Total	45,077,000					1,871,812		

Source	$ Value
Peak buses	2,312,089
Vehicle hours	271,131
Vehicle Miles	1,518,655
Passengers	1,871,812
Total Marg Cost	5,973,687

Returning to the system cost printout (Figure 1), we can divide the sheet into six areas (schematically presented in Figure 3). The first area, at the top, is the level of service measures for a selected bus line or the sum of these measures for a group of lines. Areas two to five then take these level of service measures and allocate them to specific line items to determine operating costs.

For example, area two includes line item costs that are related to (or allocated to) the level of service measure peak buses. Area three includes line items that are related to the annual hours of travel, area four line item costs related to annual miles of travel, and area five is line items related to annual passengers. Area 6 is a summary of the total costs from areas two, three, four, and five. This summary is copied into the report section (Figure 4).

The divisional printout has a similar layout, but because of space limitations in the spreadsheet, we have omitted the level of service measures summary in area one. However, these measures are identical to the totals in the system cost printout.

Having described the basic layout of these printouts, we will now examine the columns and rows of some of the areas in the printout.

The first column in Figure 1 refers to the type of variable. As discussed in the section on theory, there are direct costs, both step and fixed. The second column is the fiscal year cost for the line item. The third column, FY 1986 BASE, is the total level of service measure for the system. The first part of spreadsheet (area 2) 1987 refers to the number of buses in the system.

In the section section below, (area 3) 7585000 refers to the total number of bus hours in the system. The fourth column, step size, is the increment in the level of service (or the decrement) necessary to incur a cost increase (or decrease). Where costs are direct, the stepsize is one, meaning that costs will be a continuous function of the level of service.

The step size is calculated by dividing the annual level of service measures for the whole system by the number of employees in the corresponding line item. The number of steps (column 5) generated is calculated by dividing the total level of service measure (say peak buses or annual vehicle hours) by the step size. The sixth column is the step cost. This cost is determined by dividing the FY 1986 cost by the Fy 1986 BASE. The final column is the annual cost, which is the product of the step cost multiplied by the number of steps.

It is useful to consider a sample output to clarify the above brief description of the spreadsheet cost model. Suppose that you wish to calculate the cost of cutting bus line 203, for weekdays, Saturdays and Sundays. After specifying line 203 in the data input area the spreadsheet macro accesses the data base and places the annual totals for vehicle hours, miles, passengers, revenue and average daily peak pm buses at the top of the spreadsheet. For line 203, there is 1 PM peak bus, a total of 3785 vehicle hours, 30368 miles and 59310 passengers for a revenue of $12730 dollars.

Taking the 1 peak bus, let's work through the first part of the spreadsheet. The first line item of $150000 refers to the cost of radios in the total bus fleet (1987 buses). Since each radio costs $75 (step cost), the cost of the radios for 1 PM peak bus is $75. The second line item involves scheduling services. For there to be an increase in this cost, there must be at least 32 buses. Since there is only 1 bus, the scheduling costs will be absorbed by the existing manpower and total cost will not increase.

The systemwide costs are summarized at the foot of the spreadsheet in Figure 1.

The system costs of running line 203 are $63553 allocated amongst peak buses ($43716), vehicle hours ($3785) vehicle miles ($15394) and passengers ($658).

The division costs for line 203 are given in the next spreadsheet, Figure 2. The level of service totals for line 203 in the division spreadsheet are the same as those for the system spreadsheet. However, the unit costs, step sizes and line items are different. The method of calculation, though, is identical. In this example the division costs are $84256 and are attributable to the vehicle hours level of service variable.

Finally the summary report (Figure 3) takes the information from the two spreadsheets and combines them to produce the total cost effect of the line.

BEFORE YOU BEGIN

1. Checking Your Package,

Your Bus Cost Model package should contain this user manual, plus 1 Bus Cost Model disk. The disk contains a lotus spreadsheet model of the bus cost system. Do not use this disk except to perform the installation. Always use a copy of this disk. Making copies (backups) of your bus cost system disk is described in section 3, Installation.

2. Equipment Required To Run The Bus Cost Model.

The Bus Cost System Model you will be using requires the following computer equipment in order to be able to operate.

1. An IBM XT with a hard disk. It should have XYK memory.
2. A 122 character wide printer

The model cannot run on a standard IBM PC because of limited memory.

3. Handling Disks

5 10

INSTALLING THE BUS COST MODEL ON AN IBM XT.

Make a Backup

Before you do anything else take out the Bus Cost System disk and make a backup copy on a new disk. First make sure that you are using an IBM XT or its equivalent and that it has a hard disk.To make the backup peform the following tasks.

1. Insert a DOS 2.0 disk in drive A and turn on the computer.
2. Check to make sure that you have an A disk prompt (A>) on the screen
3. If you do not you will have a prompt from the hard disk like:C>. Change this by entering directly after this A:and press return.
4. Insert a formatted blank disk in drive B. If it is not formatted then format the disk first by typing FORMAT B:and press return.
5. Change the prompt to drive B by typing B:(don't forget return) Now type COPY A: *.* and press return.

The drive light above disk B should light up and the Lotus spreadsheet file will be copied to your back up disk. Remove the master disk from drive A and store it in a safe place apart from your back up. From now on use the backup.

STORING THE SPREADSHEET ON HARD DISK.

Next create a subdirectory on your hard disk so that you can run the buscost model from the hard disk directly. Peform the following steps:

1. Change the prompt to C: by typing C: and press return.
2. Next type MD BUSCOST and press return.
3. Then type COPY B: *.* AND PRESS RETURN.

The Bus cost spreadsheet is now stored under the subdirectory BUSCOST.

To access this spreadsheet first run LOTUS 123 then the following commands:

1. /FD\BUSCOST and press return. (Changes the file directory)
2. /FRBUSCOST and press return. (Gets the Buscost spreadsheet)

The Buscost spreadsheet will then be loaded and commence automatically.

STARTING AND ENDING A BUS COST MODEL SESSION

Starting a Session

Before starting a bus cost model session, first install BUSCOST on your IBM XT hard disk. (See "Installation" chapter)

To run BUSCOST, load LOTUS 123 as you would normally (for instructions, see the LOTUS manual). The first screen of LOTUS is the blank spreadsheet:

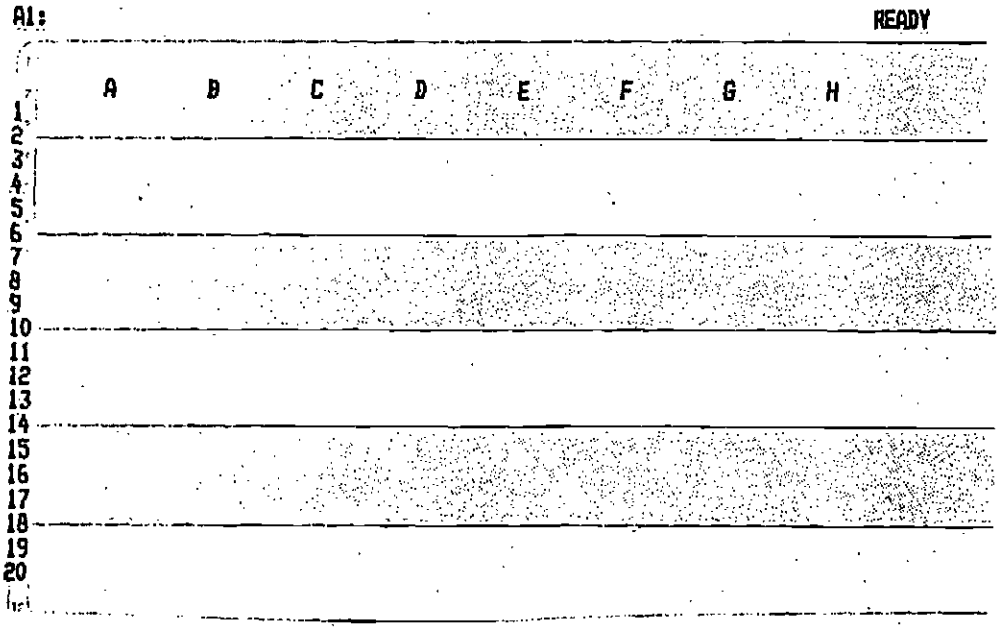


Figure 1.

Once you have loaded 123, change the directory to \BUSCOST. To do that type /fd\buscost

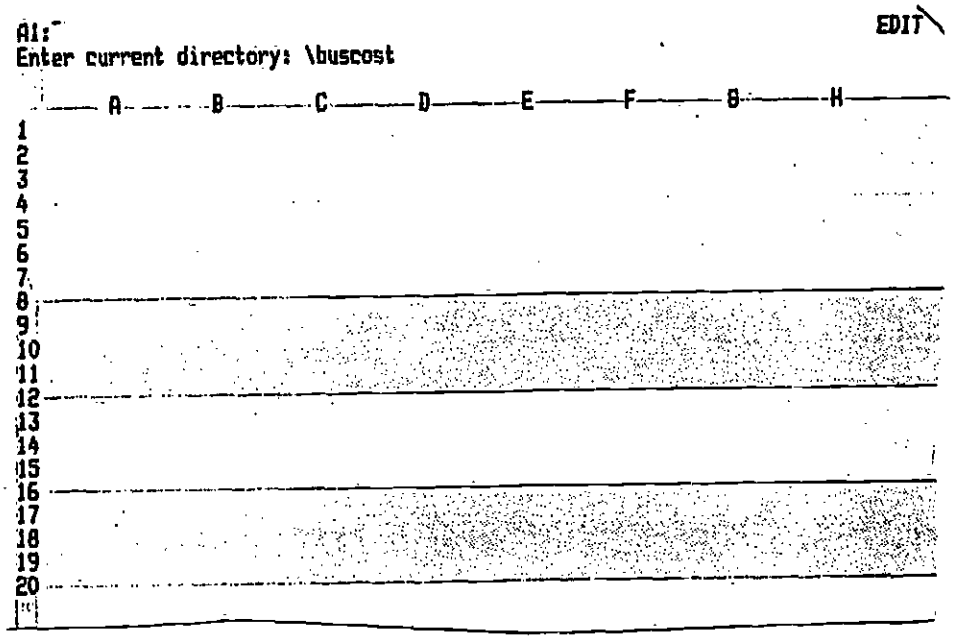


Figure 2.

To load BUSCOST enter file, retrieve buscost. To do that, type /frbuscost. If BUSCOST is the first file in the subdiretory, the cursor will be positioned on BUSCOST, and it will only be necessary to type /frreturn.

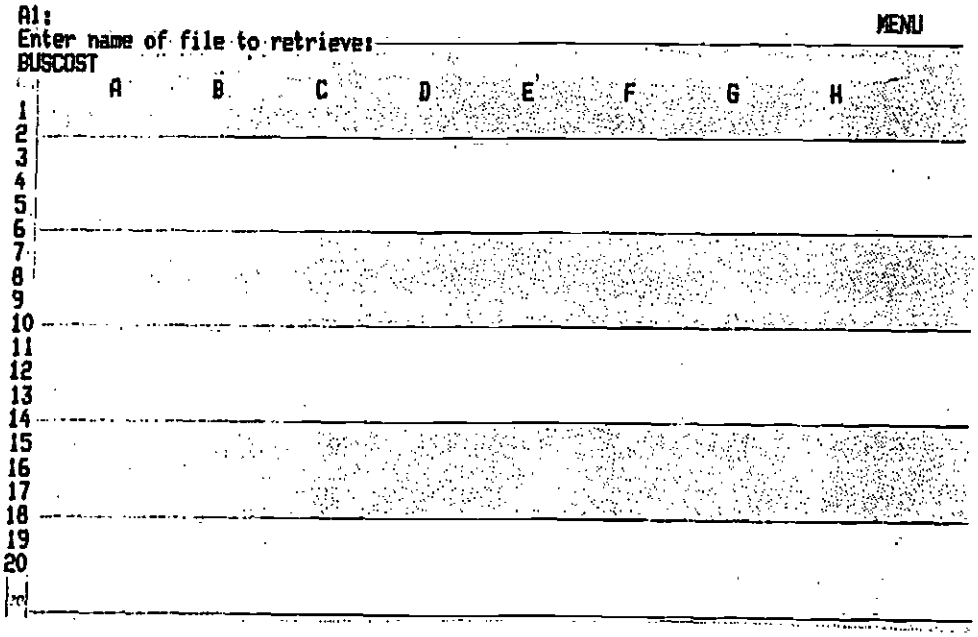


Figure 3.

The first BUSCOST screen ccontains a welcome message, a bus logo which moves quickly across the screen and stops, and the main BUSCOST menu. Figure 4 shows this screen.

```
AG13:                                                        CMD MENU
Begin  Print data  Division  System  Report  NumDay  Quit
Cost a bus line or lines
 --------AG---------AH--------AI--------AJ--------AK--------AL--------
13
14
15
16--------------------------------------------------------------------
17
18
19
20--------------------------------------------------------------------
21  WELCOME, YOU CAN START              GPC  BUS COST MODEL
22  COSTING LINES BY USING                   April 1986
23  THE  MENU  ABOVE.
24--------------------------------------------------------------------
25
26
27                                    ##############################
28 --------------------------------   ### # # # # # # # # # ##    #----
29                                    ###############################
30                                    ###############################
31            ..........................0.0.................0.........
32--------------------------------------------------------------------
                                                     CALC
```

Figure 4.

To begin costing lines, simply use the direction keys to move the cursor to the Begin position and press return.

Ending a Session

All costing procedures finish by returning you to the main menu. ~~If you wish to terminate a procedure before its completion, you can do so by pressing ALT and B at the same time. Once at the main menu, use the direction keys to move the cursor to QUIT and press return.~~

To end a session, simply continue to the end of the costing procedure, then use the direction keys to move the cursor to QUIT then hit return.

THE BUSCOST MENU

At the top of the screen, just above the spreadsheet, is the menu which allows the user to select various options for running the model and printing parts of the spreadsheet. The menu has seven options:

1. Begin. Allows you to cost a line or group of lines. Begin contains the data entry sequence.

2. Print Data. Prints a list of the number of buses, annual vehicle hours and miles and annual passengers and revenues for each line specified.

/C

EXTRACTED LINE DATA FOR COSTING

DAY	LINE	DIVISION	HOURS	MILES	PEAK BUS	PASS	TOTREV
WEEK	1	7	90,507	868,525	25	7,205,730	1,530,000
WEEK	2	7	93,106	1,127,337	26	6,330,885	1,356,600
SAT	1	7	13,813	138,340		1,027,468	236,964
SAT	2	7	13,766	161,641		696,852	169,676
SUN	1	7	14,588	152,504		922,258	211,526
SUN	2	7	10,951	132,173		530,642	135,314

3. Division. Produces a printout of the spreadsheet showing division costs.

COSTS FOR DIVISION 7

Buses 51

Type	FY 1986 Cost $	FY 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $	Department	
Step D	10,944,000	1,987	6	8	31,945	255,560	Maint. Oper. Div.	Servicing Mechanics
Step D	1,913,000	1,987	33	1	31,771	31,771	Maint. Oper. Div.	Servicing Deep Clean
Step D	2,412,000	1,987	33	1	40,180	40,180	Maint. Oper. Div.	Wheelchair Maint. Mec.
Step D	1,326,000	1,987	60	0	40,174	0	Maint. Oper. Div.	Farebox Maint. Mechan
Step D	723,000	1,987	110	0	40,025	0	Maint. Oper. Div.	Special Projects Mech.
Step D	9,742,000	1,987	153	0	750,139	0	Transp. Oper. Div.	All except Operators
Step D	1,258,000	1,987	153	0	96,867	0	Purchasing	Division Storekeepers
Step D	9,476,000	1,987	153	0	729,657	0	Maint. Oper. Div.	Misc., Supp., Admin.,
Total	37,794,000					327,511		

Hours 236,731

Type	Fy 1986 Cost $	Fy 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $		
Step D	172,358,000	7,585,000	853	277	19,383	5,369,091	Transp. Oper. Div.	Operators
Step D	14,950,000	7,585,000	853	277	1,681	465,637	Non-Dept. Expenses	Workmen's Comp.--Oper
Total	187,308,000					5,834,728		

miles 2,580,520

Type	Fy 1986 Cost $	Fy 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $		
Step D	24,152,000	107,465,000	178,810	14	40,186	562,604	Maint. Oper. Div.	Running Repair Mech.
Step D	2,009,000	107,465,000	2,149,300	1	40,180	40,180	Maint. Oper. Div.	Inspectors
Step D	241,000	107,465,000	17,910,833	0	40,167	0	Maint. Oper. Div.	Road Failure Mechanics
Total	26,402,000					602,784		

Passengers 16,713,895

Type	Fy 1986 Cost $	Fy 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $
Total						

Source	$ Value
Peak buses	327,511
Vehicle hours	5,834,728
Vehicle Miles	602,784
Passengers	1
Total Marg Cost	6,765,024

4. System, Produces a printout of the system wide spreadsheet showing for system wide costs.

System wide calculations area

Totals:	peak buses	vehicle hours	vehicle miles	pass-pass	revenue dollars $
	51	236,731	2,580,520	16,713,895	3,640,080

Buses 51

Type	FY 1986 Cost $	FY 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $	Department	ITEM
Direct	150,000	1,987	1	51	75	3,825	Facilities Maint.	Supplies --Radio
Step S	2,690,000	1,987	32	1	42,645	42,645	Scheduling	Scheduling Checkers
Step S	1,688,000	1,987	47	1	39,928	39,928	Facilities Maint.	Electronic Maint. Mec.
Step S	544,000	1,987	117	0	32,032	0	Central Maint.	Service Workers
Step S	3,861,000	1,987	142	0	275,925	0	Facilities Maint.	Electrical, Prop
Step S	702,000	1,987	142	0	50,168	0	Maintenance Gen.	Maintenance Inst
Step S	573,000	1,987	153	0	44,121	0	Transp. Services	Radio Dispatcher
Step S	574,000	1,987	166	0	47,954	0	Central Maint.	Central Shop Sup
Fixed	86,714,000	1,987	1	51	43,641	2,225,691		
Total	10,782,000					2,312,089		

Hours 236,731

Type	Fy 1986 Cost $	Fy 1986 Base	Step Size	No. of Steps	Step Cost $	Annual Cost $		
Step S	1,204,000	7,585,000	216,714	1	34,400	34,400	Maint. Oper. Div.	Non-Revenue Main
Step S	967,000	7,585,000	329,783	0	42,044	0	Scheduling	Schedule Makers

5. Report. Produces a summary printout of costs allocated to each major level of service variable: peak buses, annual hours, miles and passengers.

6. Numday. Permits the user to change the number of days a year a bus line operates during weekdays, Saturdays and Sundays.

Summary Screen Date: 18-Jun-86

Summaries for division....) 7

	System $	Division $
Peak buses	2,312,089	327,511
Vehicle hours	271,131	5,834,728
Vehicle miles	1,518,655	602,784
Passengers	1,871,812	
Total	5,973,687	6,765,023

CUMULATIVE DIVISION COSTS 6,765,023

TOTAL COST(SYS+DIV) $ 12,738,710

MARG. COST(SYS+DIV-REV)$ 9,098,630

peak buses	hours	miles	pass	rev
51	236,731	2,580,520	16,713,895	3,640,080

7. Quit. Exits the user from the spreadsheet program and returns the user to DOS.

CHANGING THE NUMBER OF WEEKDAYS, SATURDAYS, OR SUNDAYS

The NumDay option on the main BUSCOST menu allows you to adjust the number of days a year that the chosen bus lines operate on a weekday, Saturday, or Sunday schedule. Of course, the total number of days per year must always equal 365.

The standard NumDay setting is:

Weekdays: 255
Saturday: 52
Sundjays: 58

If you wish to adjust these settings, use NumDay before you use Begin to begin your run.

Using NumDay

To use the NumDay option, bring up the main menu and use the direction keys to move the cursor to NumDay.

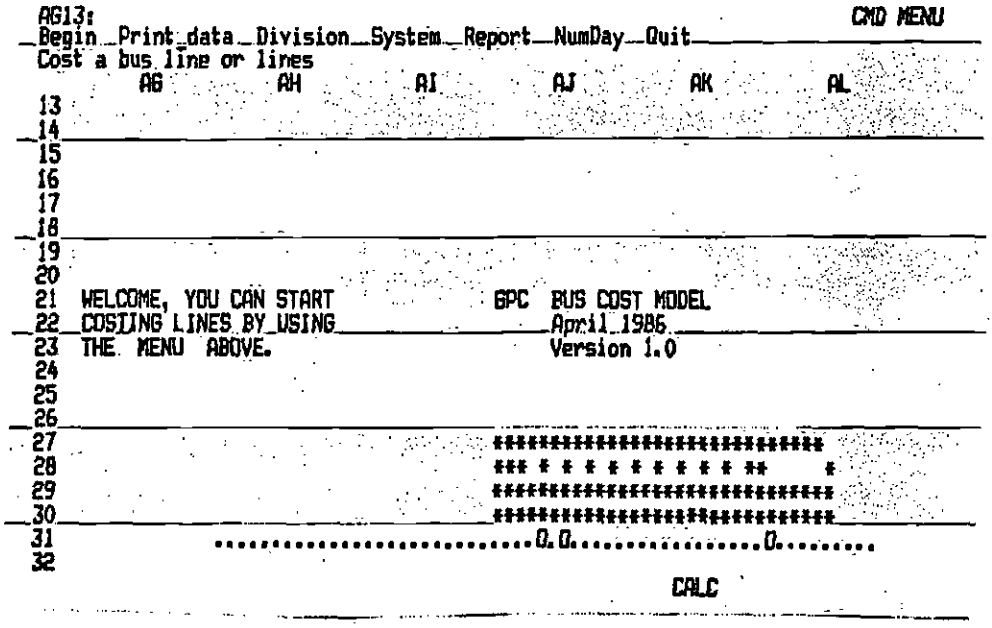


Figure 1.

Hit return to bring up the NumDay screen.

```
AF10: 255                                                    CMD READY

        AB        AC        AD        AE        AF        AG
1
2
3
4
5
6               SET THE NUMBER OF DAYS IN A YEAR FOR WEEKDAYS SAT, SUN
7
8
9
10              NUMBER OF WEEKDAYS  IN YEAR                  255
11              NUMBER OF SATURDAYS IN YEAR                   52
12              NUMBER OF SUNDAYS   IN YEAR                   58
13
14              TOTAL DAYS                                   365
15
16              (IF TOTAL DAYS () 365 TRY AGAIN, PRESS RETURN)
17
18
19
20
```

Figure 2.

Enter the new schedule, being sure the total is 365.

```
AF13: +AF10+AF11+AF12                                        CMD MENU
Begin Print data Division System Report NumDay Quit
Cost a bus line or lines
        AB        AC        AD        AE        AF        AG
4
5
6               SET THE NUMBER OF DAYS IN A YEAR FOR WEEKDAYS SAT, SUN
7
8
9
10              NUMBER OF WEEKDAYS  IN YEAR                  247
11              NUMBER OF SATURDAYS IN YEAR                   60
12              NUMBER OF SUNDAYS   IN YEAR                   58
13                                                           365
14              TOTAL DAYS                                   365
15
16              (IF TOTAL DAYS () 365 TRY AGAIN, PRESS RETURN)
17
18
19
```

Figure 3.

When the schedule is correct, hit return to continue with your BUSCOST run.

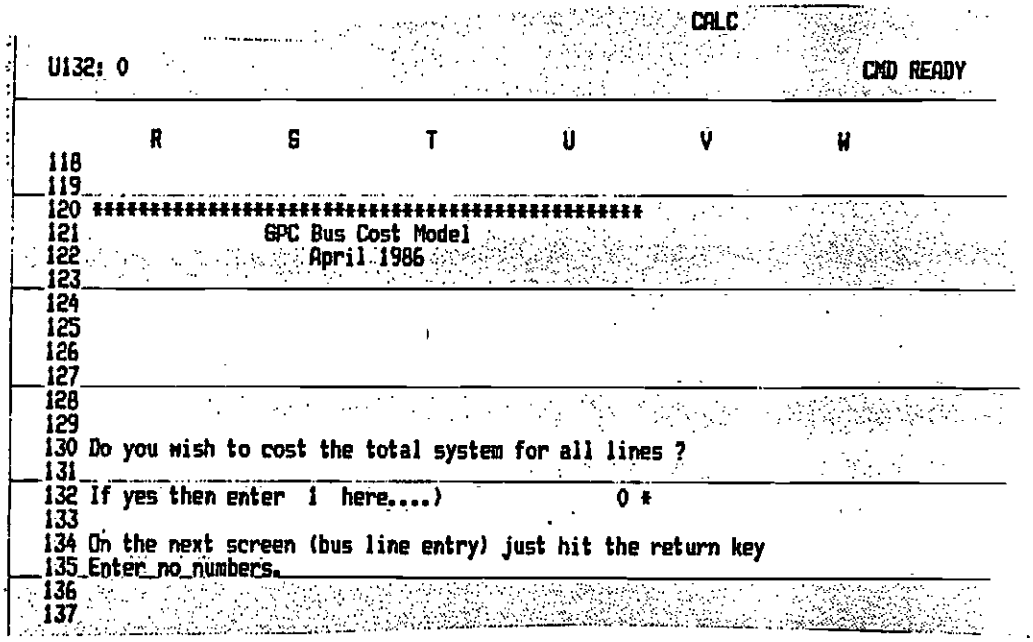


Figure 4.

HOW TO COST A SINGLE BUS LINE.

First run the model (/FRBUSCOST) so that the first screen appears. It will look like figure 1, a cartoon bus moving quickly across the sceen and stopping. Notice at the top of the spreadsheet screen there is a menu with the following items:

Begin Print data Division System Report Numday Quit
Cost a bus line or lines

This is the main menu of the program and each item is described in the chapter on Menu Options. To cost a single bus line select the item Begin by pressing the return key because the cursor is already resting on that item. If you have been performing other menu options the cursor may not be on the Begin option. Use the direction keys to move the cursor to the Begin option and then press return to select this option.

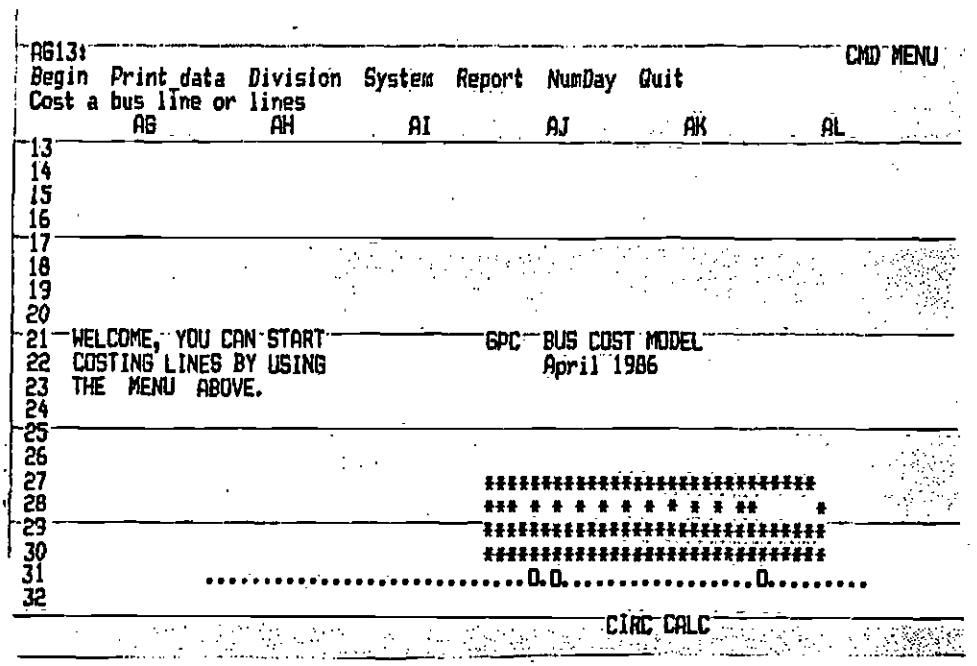


figure 1

The second screen of the bus cost model should now appear and ask you if you wish to cost the entire system (all bus lines in the data base). In this case the answer is no and you should enter a 0 and press return. This screen should look like figure 2.

```
U132: 0                                                      CMD READY
------------------------------------------------------------------------
          R         S         T         U         V         W
118
119
120 ****************************************
121            GPC Bus Cost Model
122                April 1986
123
124
125
126
127
128
129
130 Do you wish to cost the total system for all lines ?
131
132 If yes then enter  1  here....)                0 *
133
134 On the next screen (bus line entry) just hit the return key
135 Enter no numbers.
136
137
                                              CIRC CALC
```

figure 2.

The next screen asks you if you wish to cost existing bus lines or cost proposed or new lines. This screen should appear like figure 3 below. Since you wish to cost a single (existing) line just enter a 0 and press rturn.

```
AQ30: 0                                                      CMD READY

          AM        AN        AO        AP        AQ        AR
13
14
15
16
17
18               DO YOU WISH TO COST EXISTING BUS LINES
19
20                         OR
21
22               DO YOU WISH TO COST PROPOSED LINES
23
24
25
26               TO COST EXISTING LINES TYPE    " 0 "
27               TO COST PROPOSED LINES TYPE    " 1 "
28
29
30               ENTER A "1" OR "0" HERE ...........)      0
31
32
                                              CIRC CALC

AP45: U 'SAT                                                 CMD READY
```

figure 3.

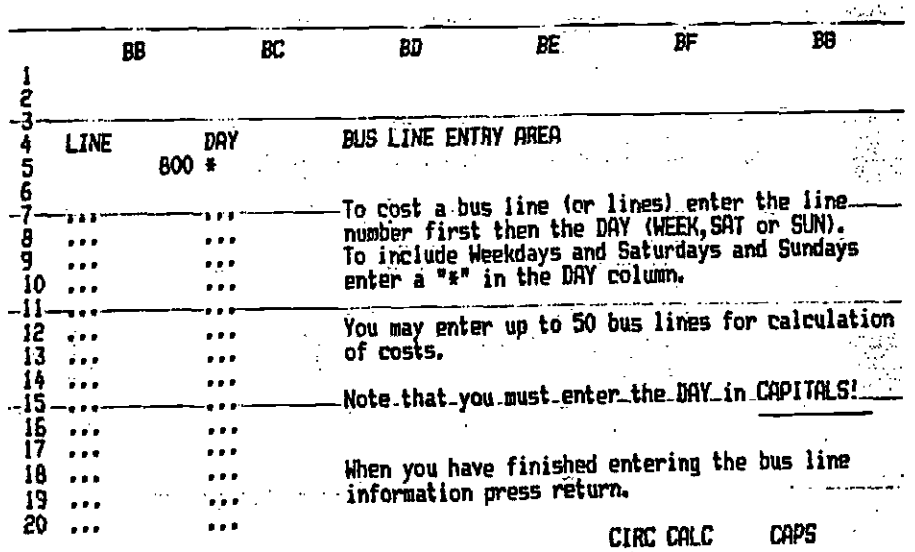
So far so good. In the next screen (Figure 4), the user must specify the bus line and the day of the week to be costed.

	BB	BC	BD	BE	BF	BG
1						
2						
3						
4	LINE	DAY	BUS LINE ENTRY AREA			
5	...	...				
6	...	...				
7	...	...	To cost a bus line (or lines) enter the line			
8	...	...	number first then the DAY (WEEK, SAT or SUN).			
9	...	...	To include Weekdays and Saturdays and Sundays			
10	...	...	enter a "*" in the DAY column.			
11	...	...				
12	...	...	You may enter up to 50 bus lines for calculation			
13	...	...	of costs.			
14	...	...				
15	...	...	Note that you must enter the DAY in CAPITALS!			
16	...	...				
17	...	...				
18	...	...	When you have finished entering the bus line			
19	...	...	information press return.			
20	...	...				
				CIRC CALC		

The cursor is resting directly under LINE. Next the user enters a line number between 1 and xyz. Note that some lines are coupled and appear under just one number. For example, 471 is not in the data base because it is coupled with 470 and 471 is in the data base. Coupled lines cannot be split. After entering the line number use the right direction arrow to enter the number into the spreadsheet and move the cursor over to the DAY column. You have a choice of obtaining the cost for either weekdays, Saturdays or Sundays.

For weekdays type WEEK
For Saturdays type SAT
For Sundays type Sun

If you wish to cost the line for all these days you could just enter a * in the day column. If you wanted to cost just Weekdays and Saturdays then you need to type the following. Enter WEEK under the day column and then use the direction arrows(left and down) to move to the LINE column and enter below the first line number you entered the same line number again. Use the right direction arrow to move to the DAY column and enter SAT. Your screen should look like figure 5, which appears on the following page.

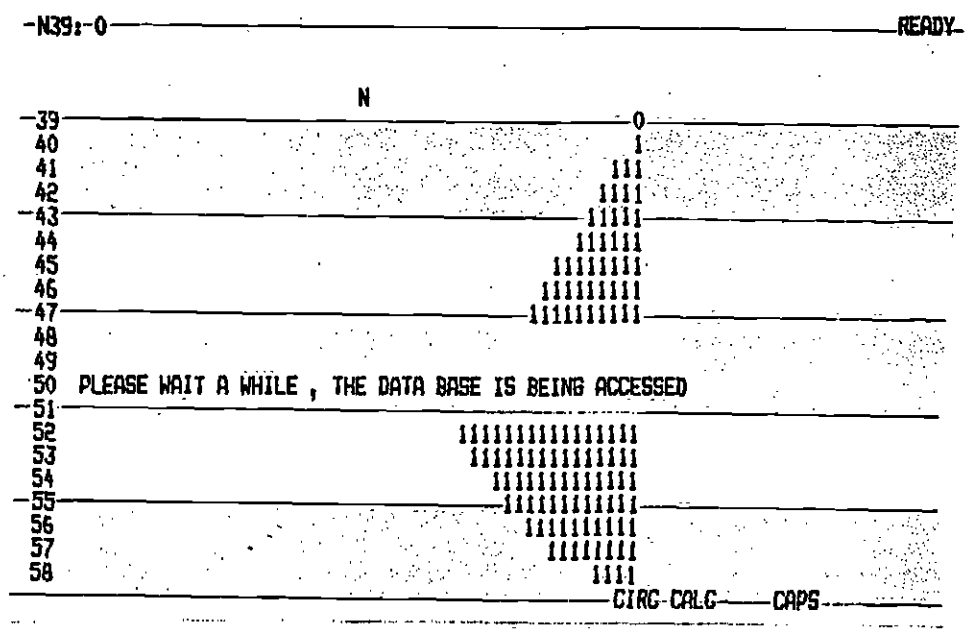


SCREEN AFTER DATA ENTRY
FIGURE 5.

IT IS IMPORTANT TO NOTE THAT YOU NEED TO HAVE THE CAPS LOCK KEY TURNED ON SO THAT THE ENTRIES IN THE DAY COLUMN ARE ALL IN CAPTIALS!!!!!

Now if they are not just press caps lock and then use the direction keys to move to those entries you want to change.

Finally press return twice and the following screen will appear.



This screen informs you that the data base is being accessed. The program is searching the data base to find the level of service information for the specified Line number and day of week. Because the data base is large this takes about 1 minute, so be patient.

Once this is accomplished the program then displays a blank summary screen whilst it calculates the costs. The level of service values for the line are displayed at the base of the summary sheet.

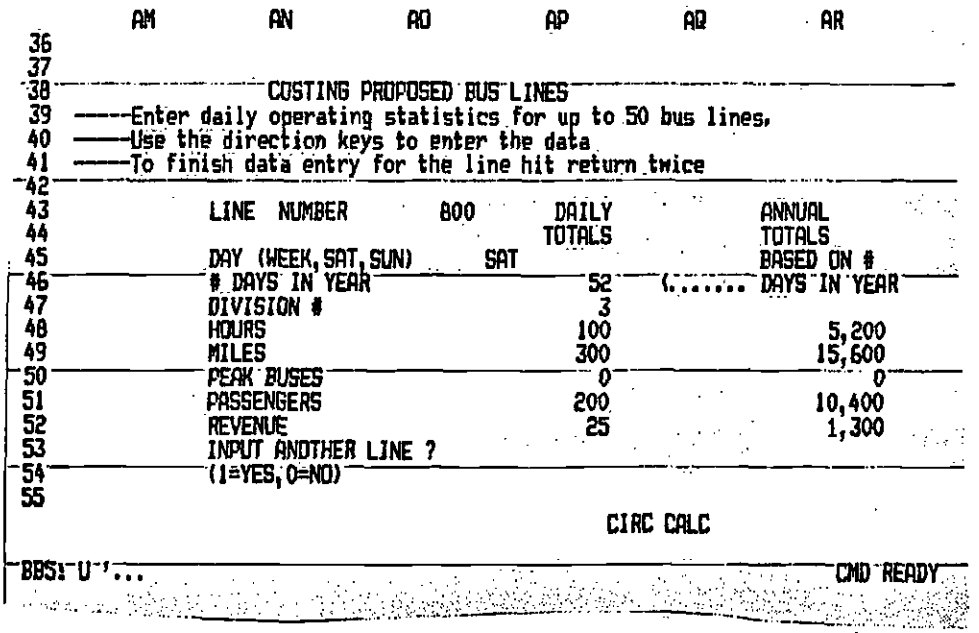


figure 7

The final screen to appear automatically asks you if you want a print out of the division calculations and the summary sheet. You usually will so enter a 1 and press return in each case. (figure 8). Make sure the printer is turned on and the condensed print is on..(note to me... need to have printer set up chapter)

25a

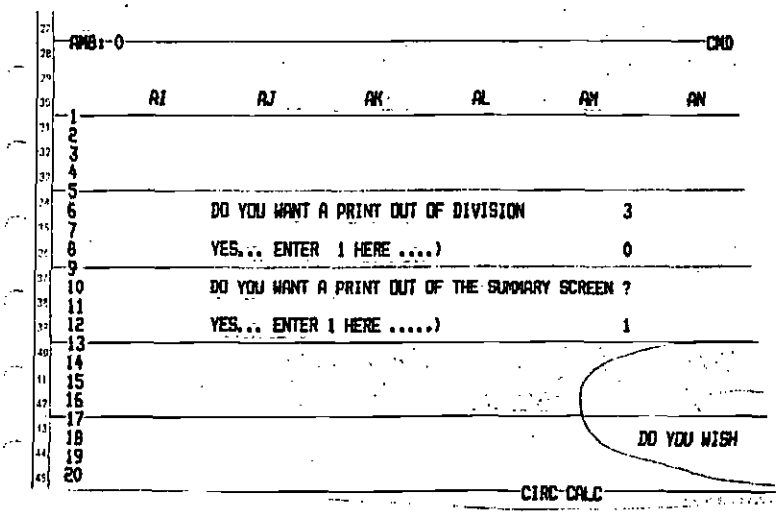
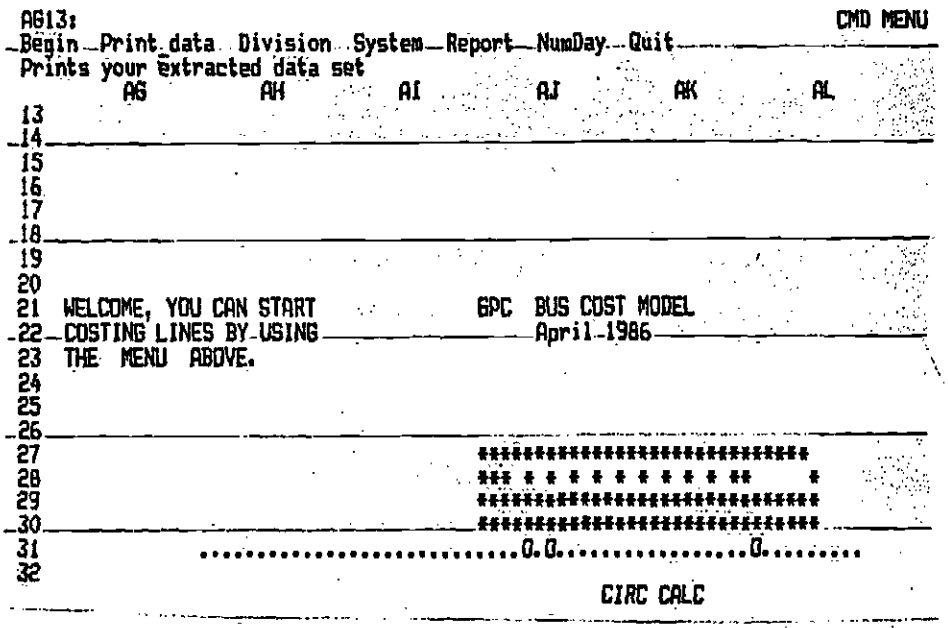

AMB:-0
CMD
AI
AJ
AK
AL
AM
AN
DO YOU WANT A PRINT OUT OF DIVISION
3
YES... ENTER 1 HERE ....)
0
DO YOU WANT A PRINT OUT OF THE SUMMARY SCREEN ?
YES... ENTER 1 HERE .....)
1
DO YOU WISH
CIRC-CALC

figure 8.

The next screen to appear is the beginning screen with the bus logo. This is the master menu and you should now move the cursor to System and print out the System costs and to Print Data for a print out of the data base.

This completes the process of costing a single line. You could now go on to cost more lines,change the lines level of service etc.



COSTING GROUPS OF LINES

The procedues for costing groups of lines are identical to costing one line. Any group of up to 50 lines may be costed at one time.

Remember, the BUSCOST options for choosing to cost existing or proposed lines and fully allocated or not fully allocated costs can only be exercised once for the entire group of lines to be costed.

Also, when costing groups of lines, remember that while line numbers are essentially consecutive, gaps exist so that not every number represents an existing line.

COST

HOW TO COST THE ENTIRE BUS SYSTEM

Load the model (/FRBUSCOST) to bring up the first screen. It will look like Figure 1, a cartoon bus which drives quickly across the screen and stops. Notice at the top of the spreadsheet screen is the following menu:

Begin Print data Division System Report Numday Quit
Cost a bus line or lines

This is the main menu of the program. Each item is described in the chapter entitled "Menu Options." To cost the entire bus system, select the item Begin by moving the cursor to Begin using the direction keys and pressing the return key.

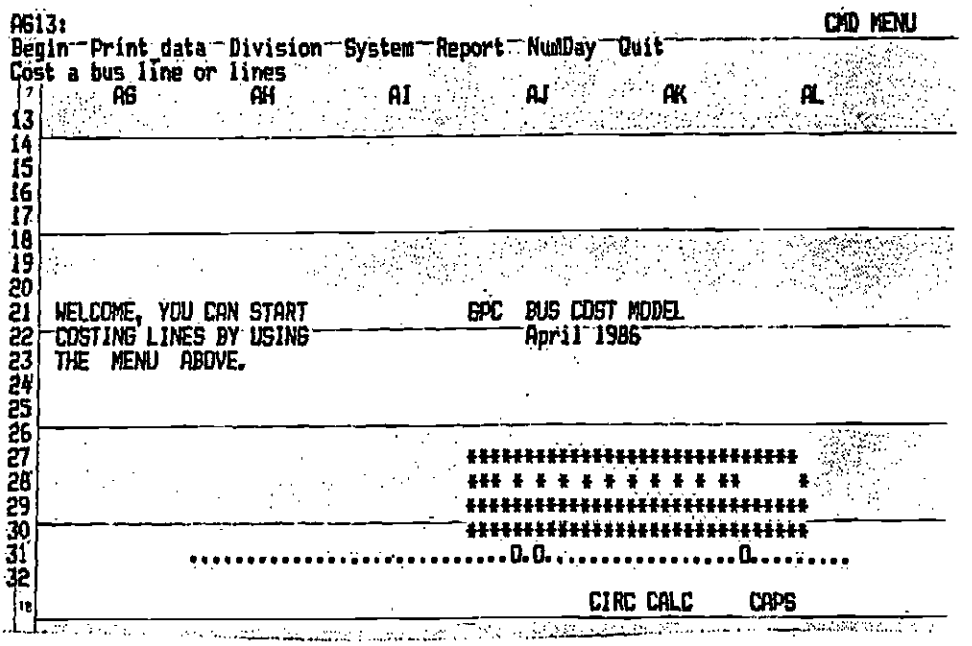


Figure 1

The second screen of the bus cost model now appears and asks whether you wish to cost the entire system (all bus lines in the data base). In this case the answer is yes, you enter 0 and press return. This screen will look like Figure 2.

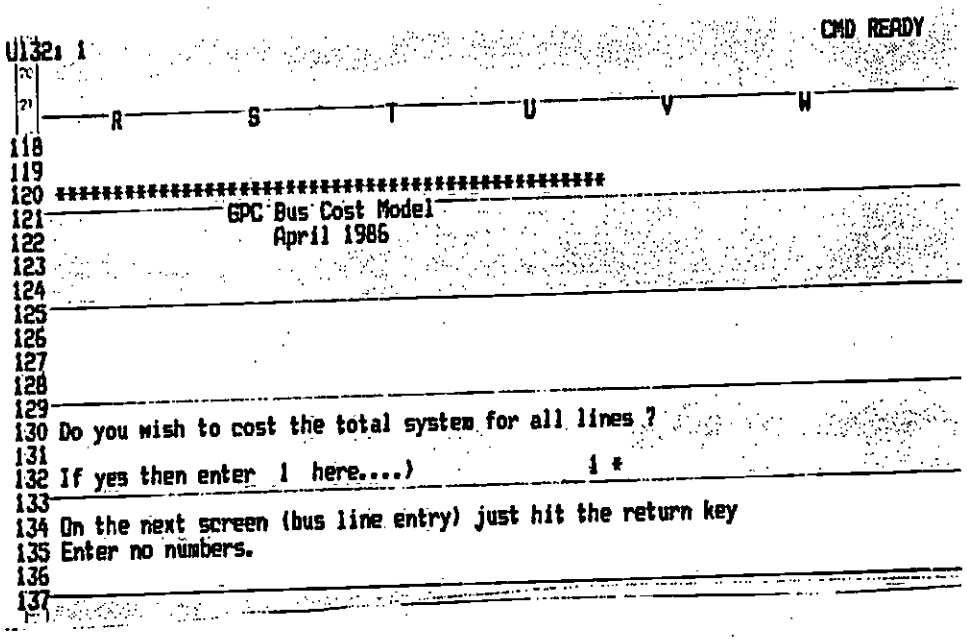


Figure 2.

The bus line entry screen will appear. To cost the entire system, press return twice.

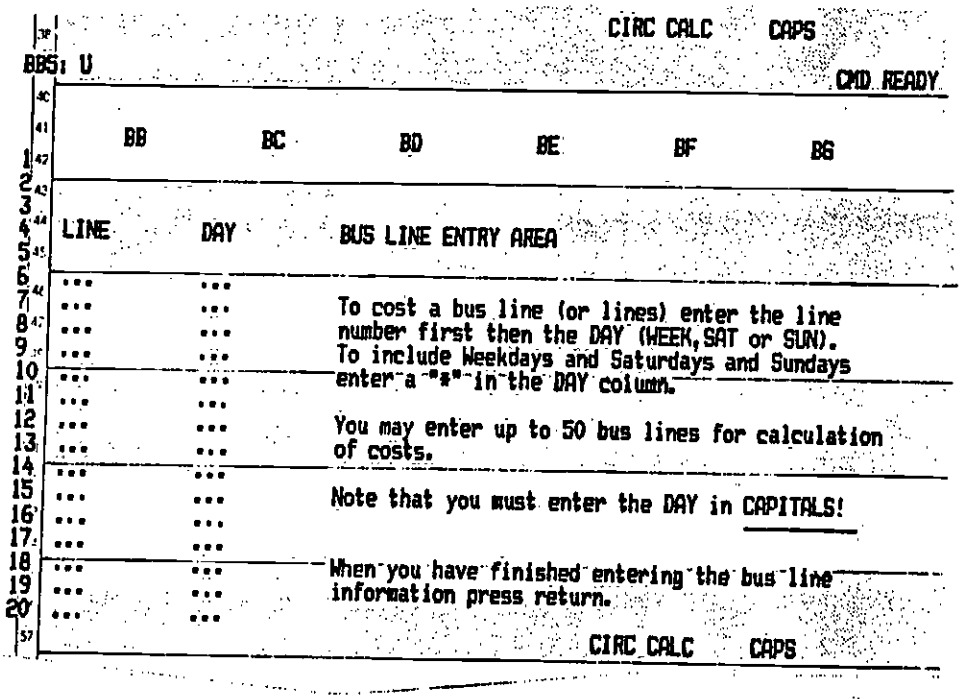


Figure 3.

The next screen informs you that the data base is being accessed. The program is searching the data base to find the level of service information for the specified Line number and day of week. Because the data base is large this takes about 1 minute, so please be patient.

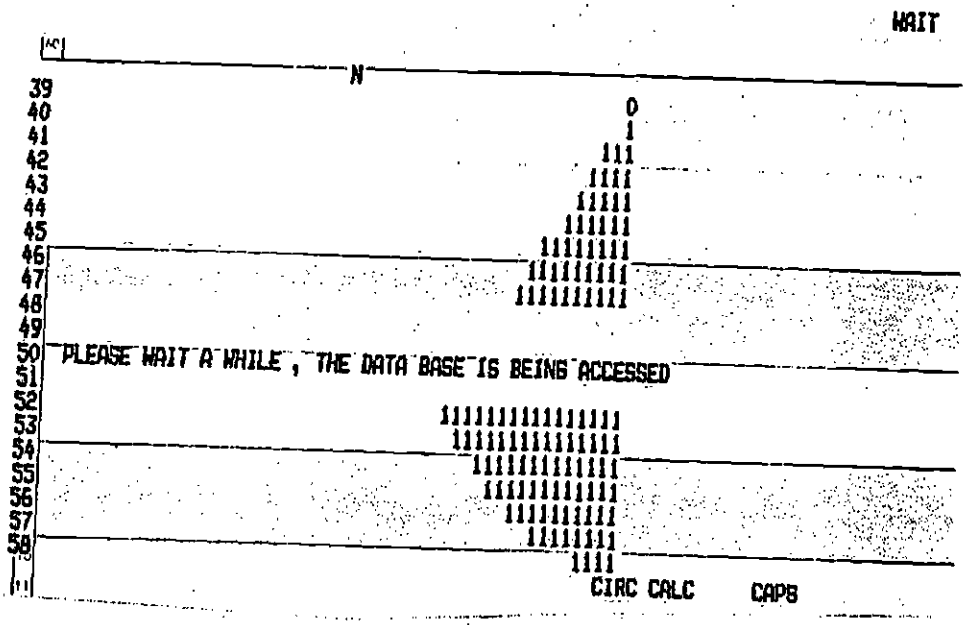


Figure 4.

The next screen (Figure 6) asks you if you wish to change the service on an existing bus line. You may if you wish, but in this example we do not. Therefore, enter 0.

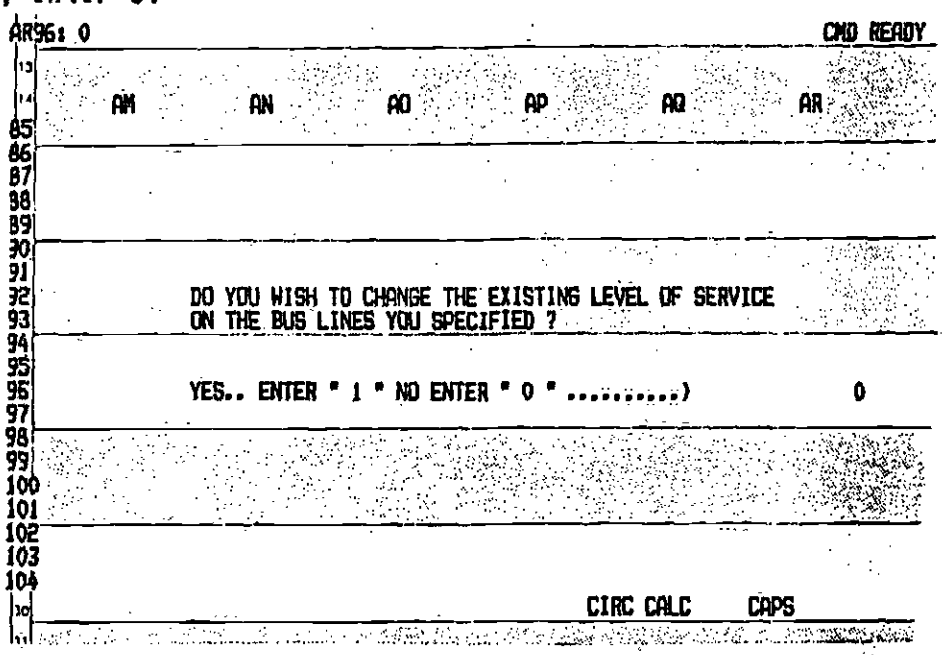


Figure 5

Now the model asks you if you wish to run fully allocated costs. These are the fixed costs in the budget. If you do, enter 1 as in Figure 6.

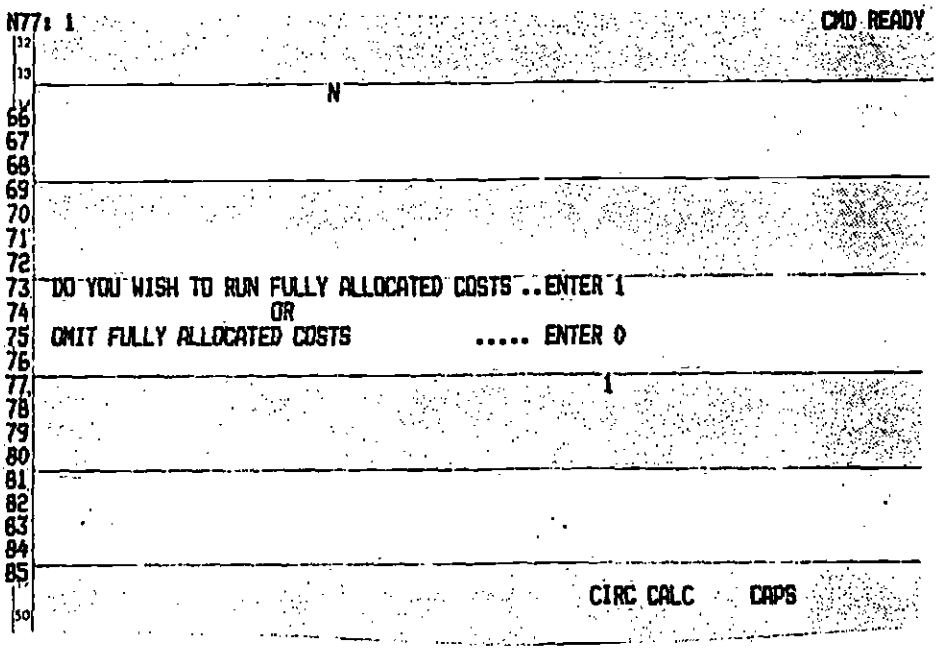


Figure 6

The program now displays a blank summary screen whilst it calculates the costs. The level of service values for the line are displayed at the base of the summary sheet.

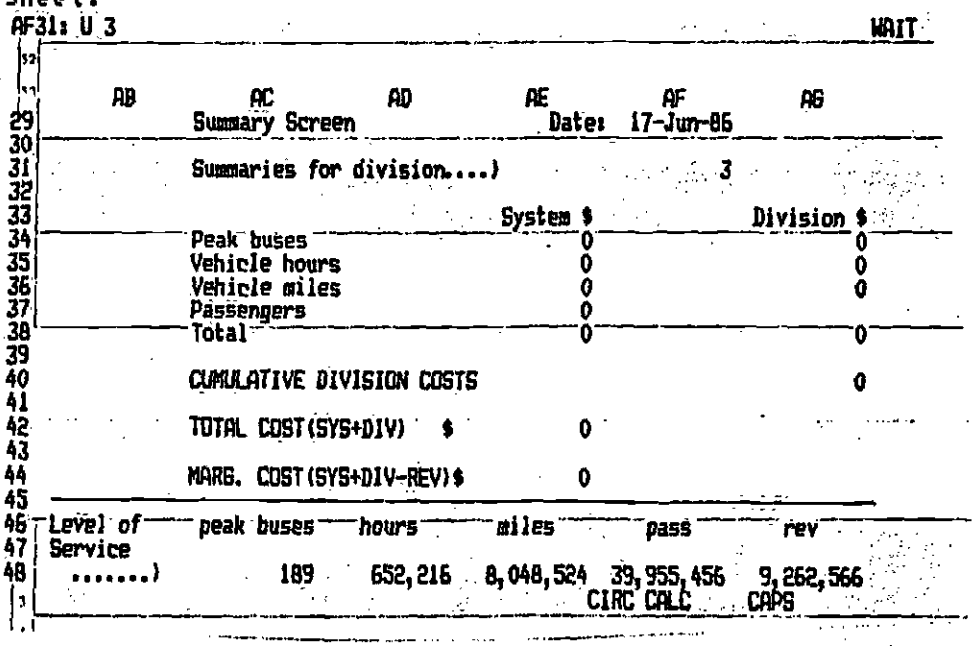


Figure 7

The next screen asks whether you want a printout of the division calculations and the summary sheet. You usually will, so enter a 1 and press return in each case. (Figure 8). Be sure your printer is turned on and that condensed print is on.

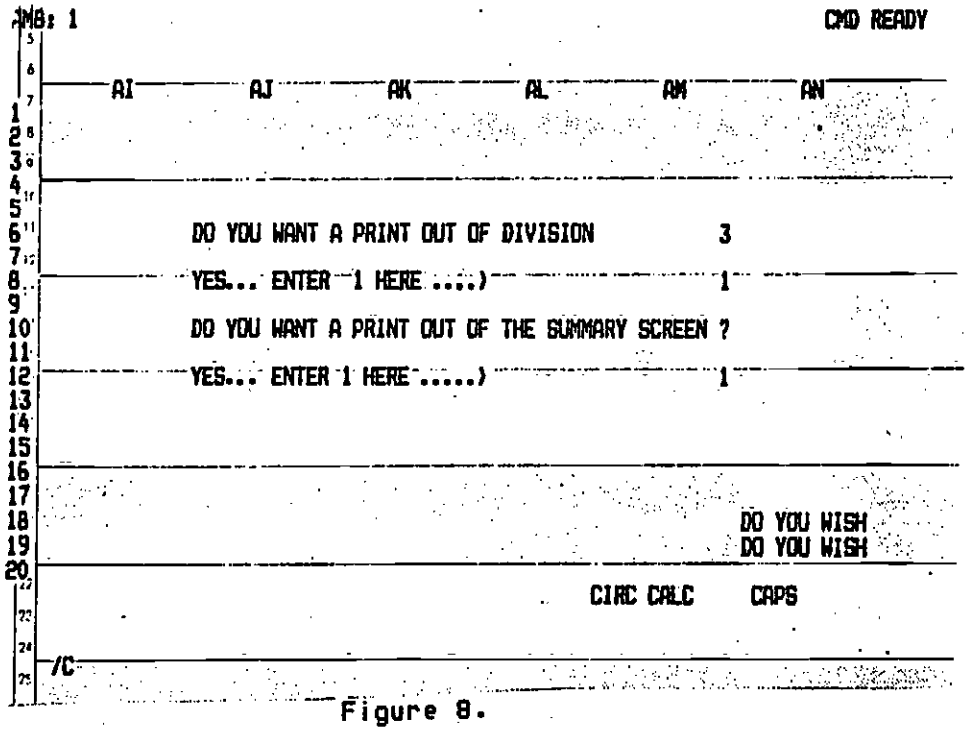


Figure 8.

In this case the last division to be printed is Division 16. The Division 16 Summary Screen includes the cumulative costs for the entire bus system.

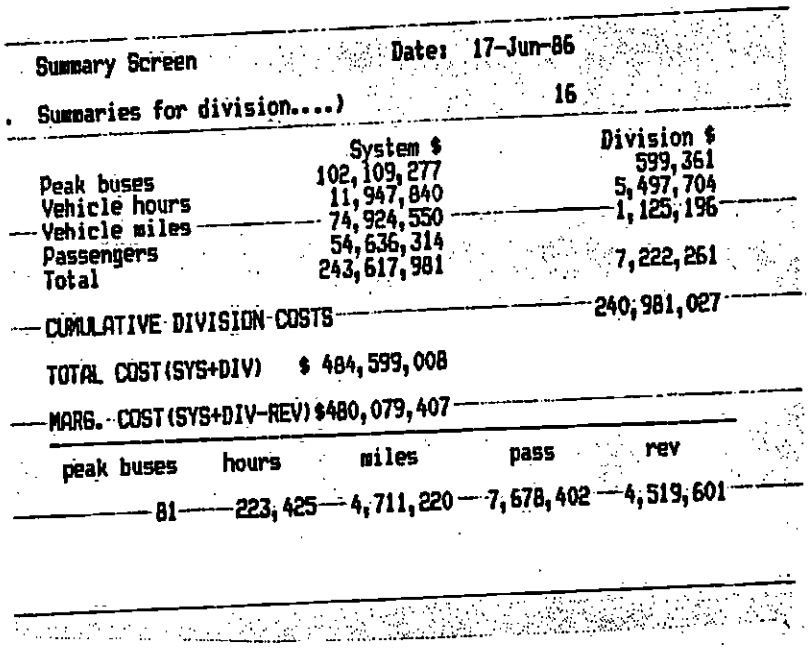


Figure 9.

HOW TO COST A NEW LINE.

First load the model (/FRBUSCOST) to bring up the first screen. It will look like Figure 1, a cartoon bus which drives quickly across the screen and stops. Notice at the top of the spreadsheet screen there is a menu with the following items:

Begin Print data Division System Report Numday Quit
Cost a bus line or lines

This is the main menu of the program. Each item is described in the chapter entitled "Menu Options." To cost a new bus line, select the item Begin by moving the cursor to Begin using the direction keys and pressing the return key.

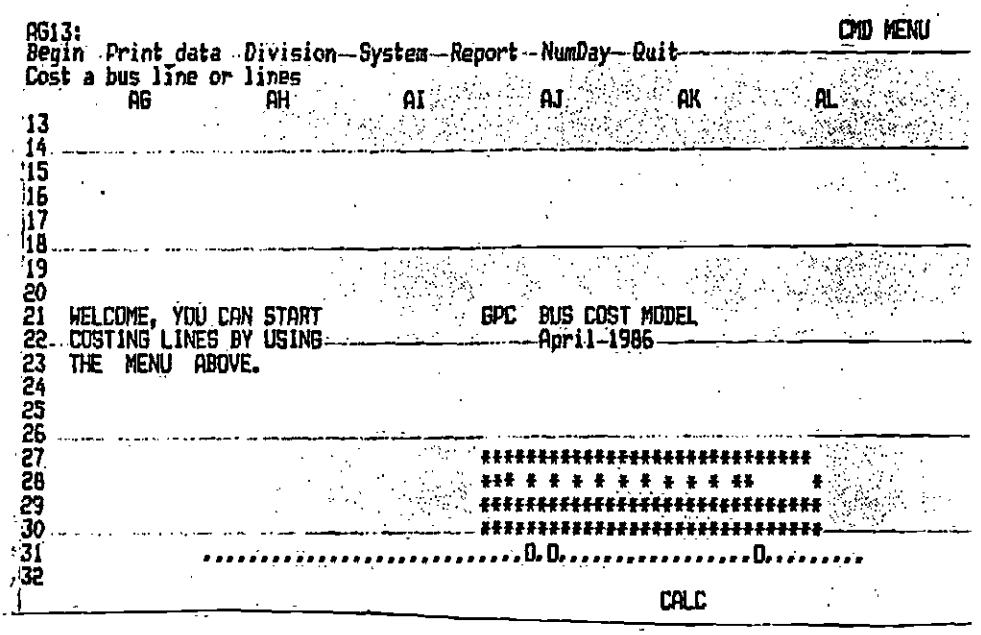


Figure 1

The second screen of the bus cost model now appears and asks whether you wish to cost the entire system (all bus lines in the data base). In this case the answer is no, you enter 0 and press return. This screen will look like Figure 2.

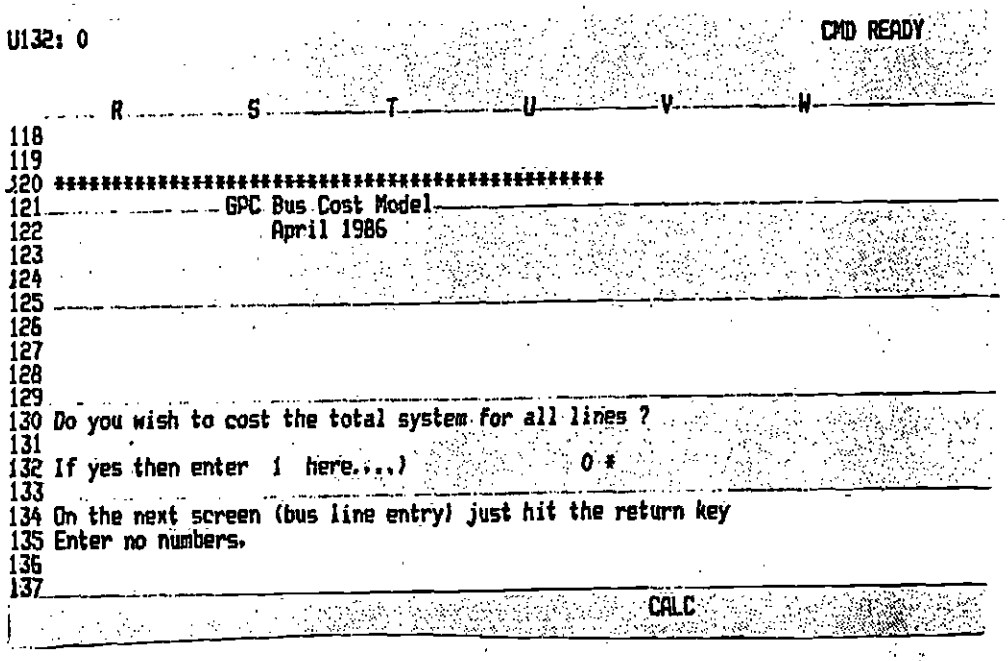


Figure 2.

The next screen asks whether you wish to cost existing bus lines or proposed (new) lines. This screen will appear like Figure 3 below. Since you wish to cost a new line just enter 1 and press return.

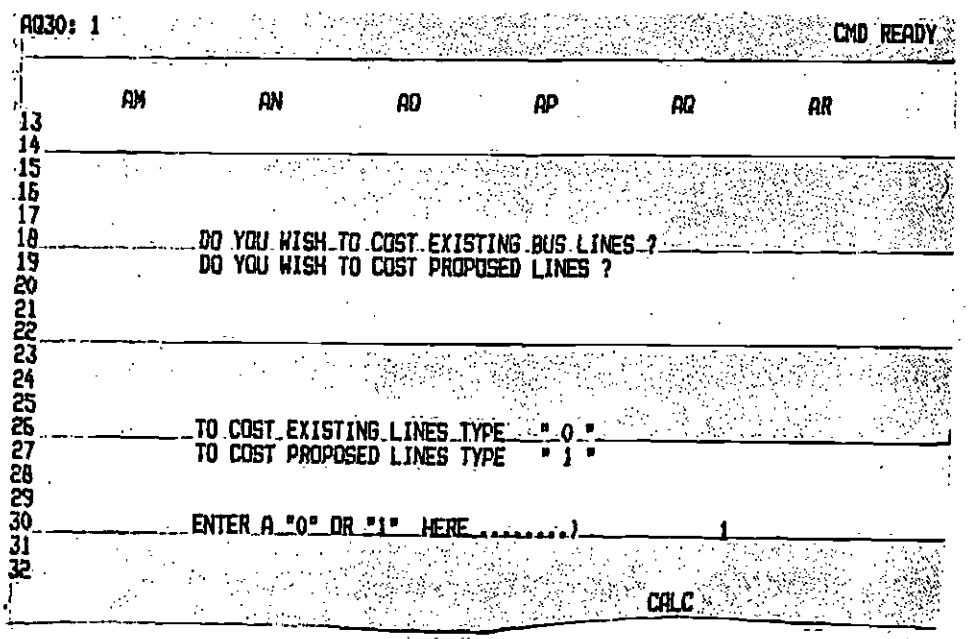


Figure 3.

The next screen, Figure 4, asks you to cost a proposed line. You can cost up to 50 bus lines, but let's just do one for a weekday and Saturday. The cursur will be resting on the line number and you can enter any number between 800 and 850.

```
AO43: U 810                                                        CMD READY

        AM         AN          AO          AP          AQ          AR
38                 COSTING PROPOSED BUS LINES
39   -----Enter daily operating statistics for up to 50 bus lines.
40   -----Use the direction keys to enter the data
41   -----To finish data entry for the line hit return twice
42
43              LINE  NUMBER        810      DAILY            ANNUAL
44                                           TOTALS           TOTALS
45              DAY  (WEEK,SAT,SUN)      WEEK                 BASED ON #
46              # DAYS IN YEAR                   52   (...... DAYS IN YEAR
47              DIVISION #                        3
48              HOURS                            20                1,040
49              MILES                           100                5,200
50              PEAK BUSES                       10                   10
51              PASSENGERS                      500               26,000
52              REVENUE                       1,000               52,000
53              INPUT THE CHANGE ?                1
54              (1=YES,0=NO)
55
56
57
                                                       CALC
```

Figure 4.

Suppose you enter the following data in Figure 5:

```
AP53: U 1                                                          CMD READY

        AM         AN          AO          AP          AQ          AR
38                 COSTING PROPOSED BUS LINES
39   -----Enter daily operating statistics for up to 50 bus lines.
40   -----Use the direction keys to enter the data
41   -----To finish data entry for the line hit return twice
42
43              LINE  NUMBER        700      DAILY            ANNUAL
44                                           TOTALS           TOTALS
45              DAY  (WEEK,SAT,SUN)      WEEK                 BASED ON #
46              # DAYS IN YEAR                  255   (...... DAYS IN YEAR
47              DIVISION #                        3
48              HOURS                           200                1,040
49              MILES                         1,000                5,200
50              PEAK BUSES                       10                   10
51              PASSENGERS                    1,000               26,000
52              REVENUE                       2,000               52,000
53              INPUT THE CHANGE ?                1
54              (1=YES,0=NO)
55
56
57
                                                       CALC
```

Figure 5.

The next screen to appear, Figure 6, will contain an error message telling you that the line number is incorrect and must be changed.

```
A043: U 700                                                    CMD READY

     AM        AN        AO        AP        AQ        AR
38              COSTING PROPOSED BUS LINES
39  ----Enter daily operating statistics for up to 50 bus lines.
40  ----Use the direction keys to enter the data
41  ----To finish data entry for the line hit return twice
42
43          LINE NUMBER      700      DAILY          ANNUAL
44                                    TOTALS         TOTALS
45          DAY (WEEK,SAT,SUN)       WEEK           BASED ON #
46          # DAYS IN YEAR                  255   (..... DAYS IN YEAR
47          DIVISION #                        3
48          HOURS                           200          1,040
49          MILES                         1,000          5,200
50          PEAK BUSES                       10             10
51          PASSENGERS                    1,000         26,000
52          REVENUE                       2,000         52,000
53          INPUT THE CHANGE ?                1
54          (1=YES,0=NO)
55
56
57  PROPOSED LINE NUMBERS MUST BE BETWEEN 800 AND 850
                                                           CALC
```

Figure 6.

If you correct the line number and reenter the data by pressing return, you will receive another error message telling you that the division number is incorrect.

```
A043: U 825                                                    CMD READY

     AM        AN        AO        AP        AQ        AR
38              COSTING PROPOSED BUS LINES
39  ----Enter daily operating statistics for up to 50 bus lines.
40  ----Use the direction keys to enter the data
41  ----To finish data entry for the line hit return twice
42
43          LINE NUMBER      825      DAILY          ANNUAL
44                                    TOTALS         TOTALS
45          DAY (WEEK,SAT,SUN)       WEEK           BASED ON #
46          # DAYS IN YEAR                  255   (..... DAYS IN YEAR
47          DIVISION #                        4
48          HOURS                           200          1,040
49          MILES                         1,000          5,200
50          PEAK BUSES                       10             10
51          PASSENGERS                    1,000         26,000
52          REVENUE                       2,000         52,000
53          INPUT THE CHANGE ?                1
54          (1=YES,0=NO)
55
56
57  NOT A VALID DIVISION NUMBER... TRY AGAIN!
                                                           CALC
```

Figure 7.

When you have finished entering proposed bus lines, enter a 1 on the last line of the column as in Figure 8. And hit return twice

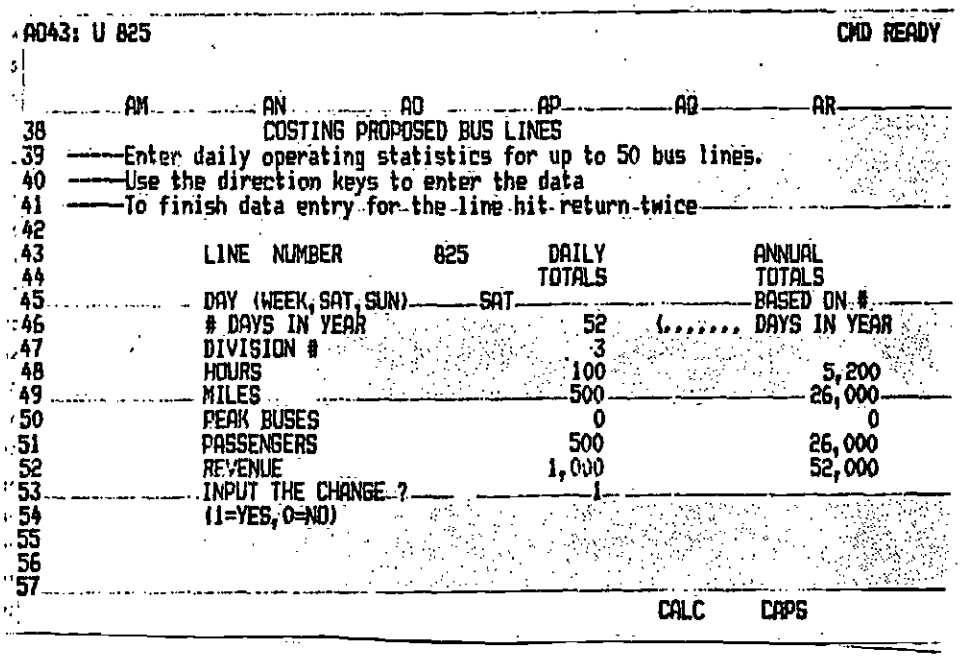


Figure 8.

So far so good. In the next screen (Figure 9), the you must specify the bus line and the day of the week to be costed.

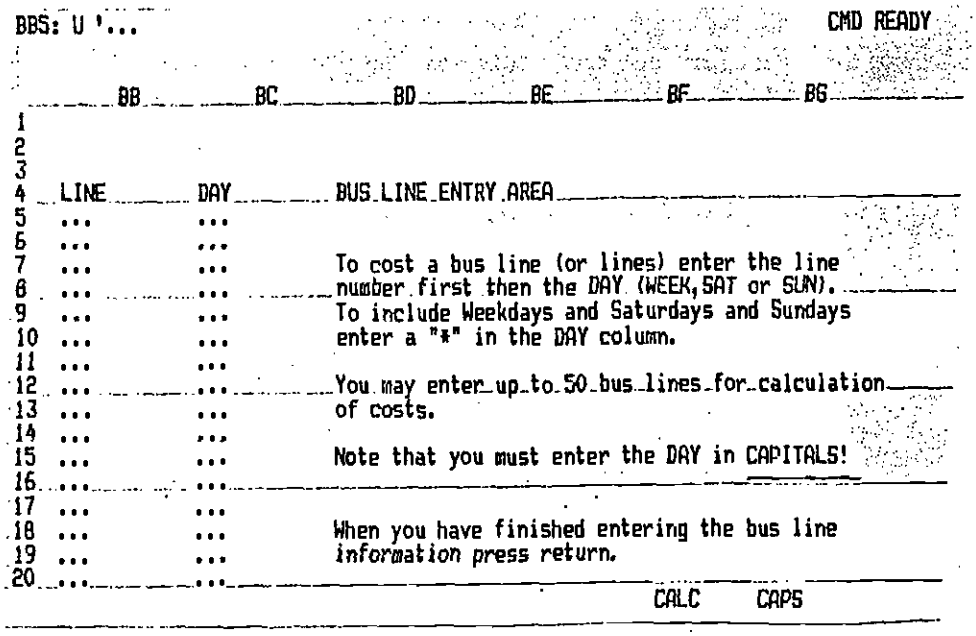


Figure 9.

The cursor is resting directly under LINE. Enter the line number previously chosen above. After entering the chosen line number (825), use the right direction arrow to enter the number into the spreadsheet and move the cursor over to the DAY column.

For weekdays type WEEK
For Saturdays type SAT
For Sundays type SUN

If you wish to cost the line for all seven days you may just enter a * in the day column. If you wish to cost just Weekdays and Saturdays then you must type the following. Enter WEEK under the day column, then use the direction arrows (left and down) to move to the LINE column. Below the first line number reenter the same line number. Use the right direction arrow to move to the DAY column and enter SAT.

Your screen now looks like Figure 10.

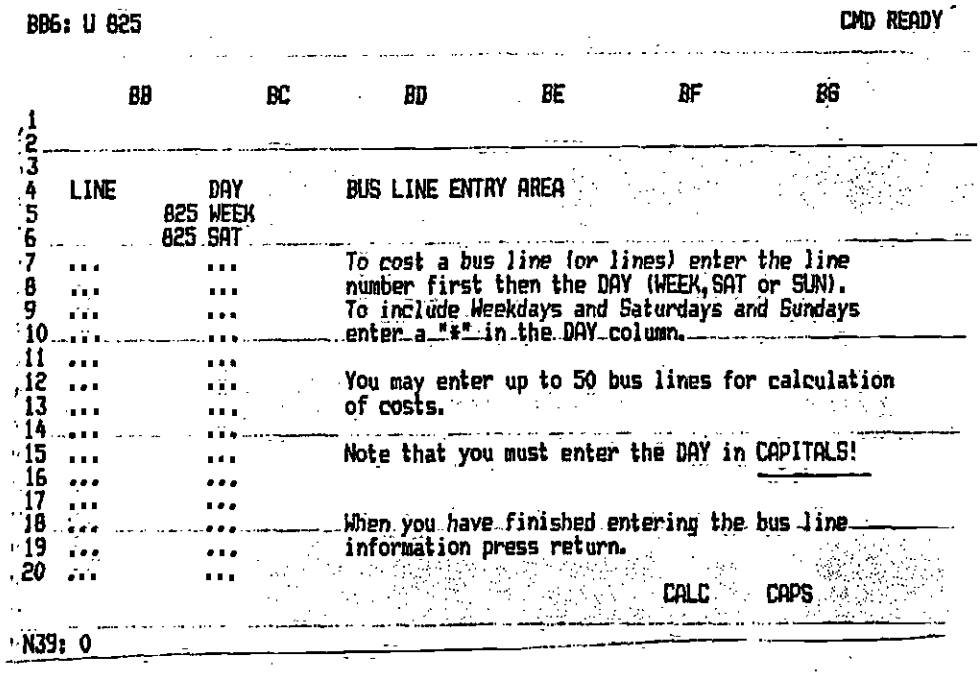


Figure 10.

IT IS IMPORTANT TO NOTE THAT YOU NEED TO HAVE THE CAPS LOCK KEY TURNED ON SO THAT THE ENTRIES IN THE DAY COLUMN ARE ALL IN CAPTIALS!!!!!

If any entry is not in all caps, you must change it now. Just press caps lock, then use the direction keys to move to those entries that must be changed. When the entry is correct, press return twice to move to the next screen.

The next screen informs you that the data base is being accessed. The program is searching the data base to find the level of service information for the specified Line number and day of week. Because the data base is large this takes about 1 minute, so please be patient.

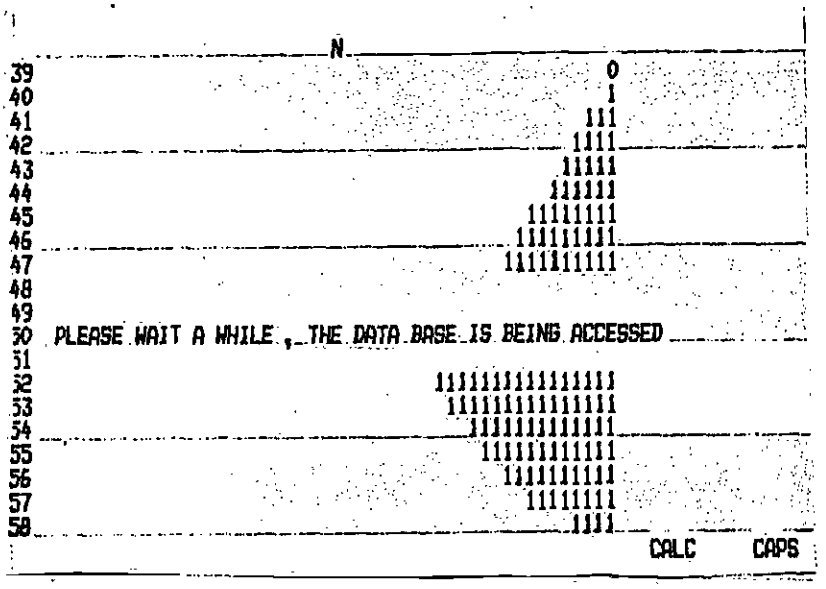


Figure 11.

The next screen (Figure 12) asks you if you wish to change the service on an existing bus line. Since you have just defined the proposed bus lines, you will not use this option. Therefore, enter 0.

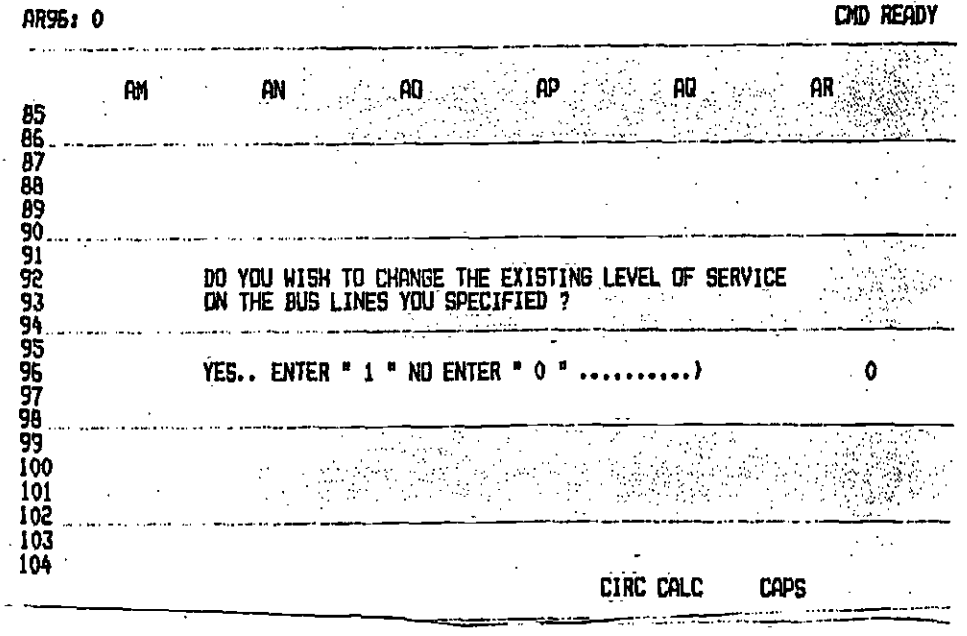


Figure 12

Now the model asks you if you wish to run fully allocated costs. These are the fixed costs in the budget. If you do, enter 1 as in Figure 13.

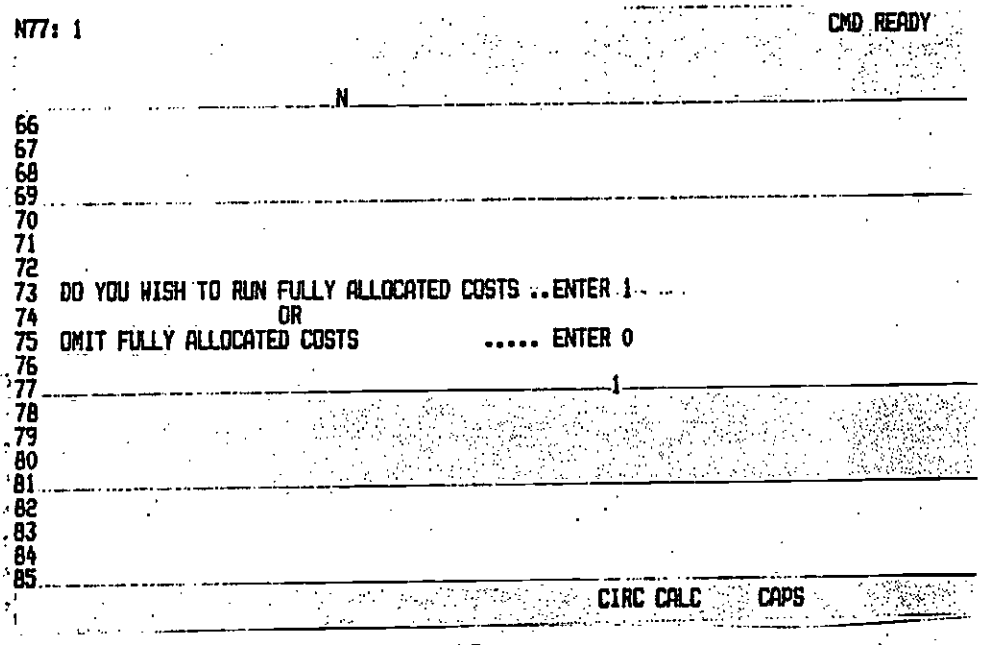


Figure 13

The program now displays a blank summary screen whilst it calculates the costs. The level of service values for the line are displayed at the base of the summary sheet.

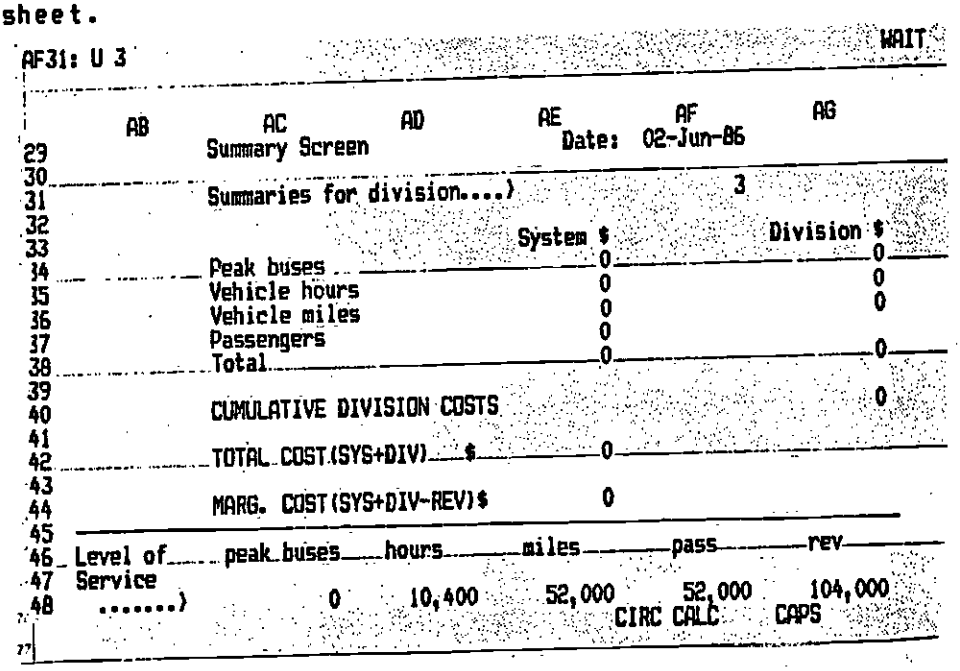


Figure 14

The next screen asks whether you want a printout of the division calculations and the summary sheet. You usually will, so enter a 1 and press return in each case. (Figure 15). Be sure your printer is turned on and that condensed print is on.

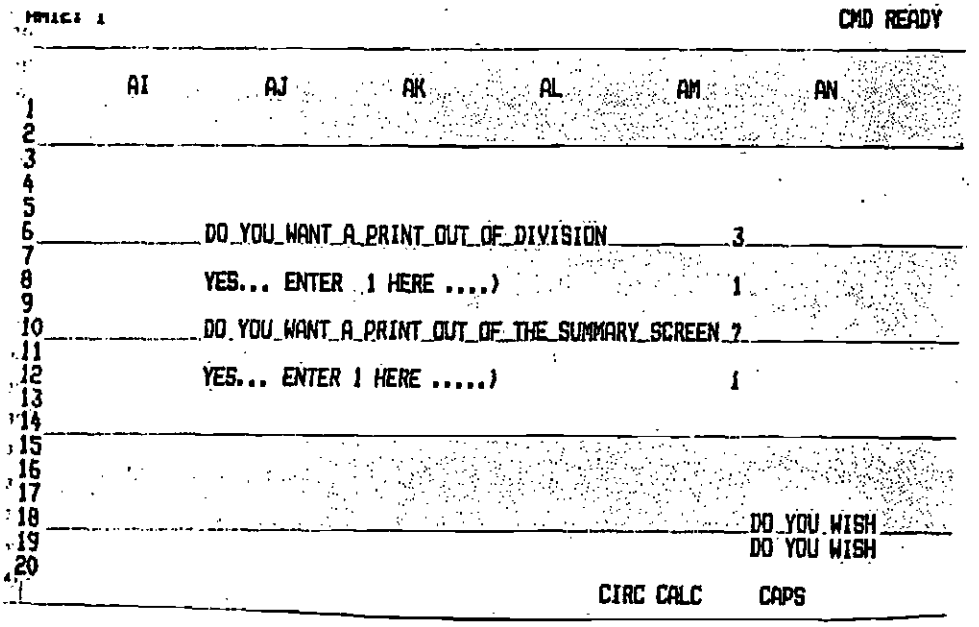


Figure 15.

The model now brings you back to the first screen which contains the bus logo and the master menu. Move the cursor to System to print the system costs and to Print Data to print the data base.

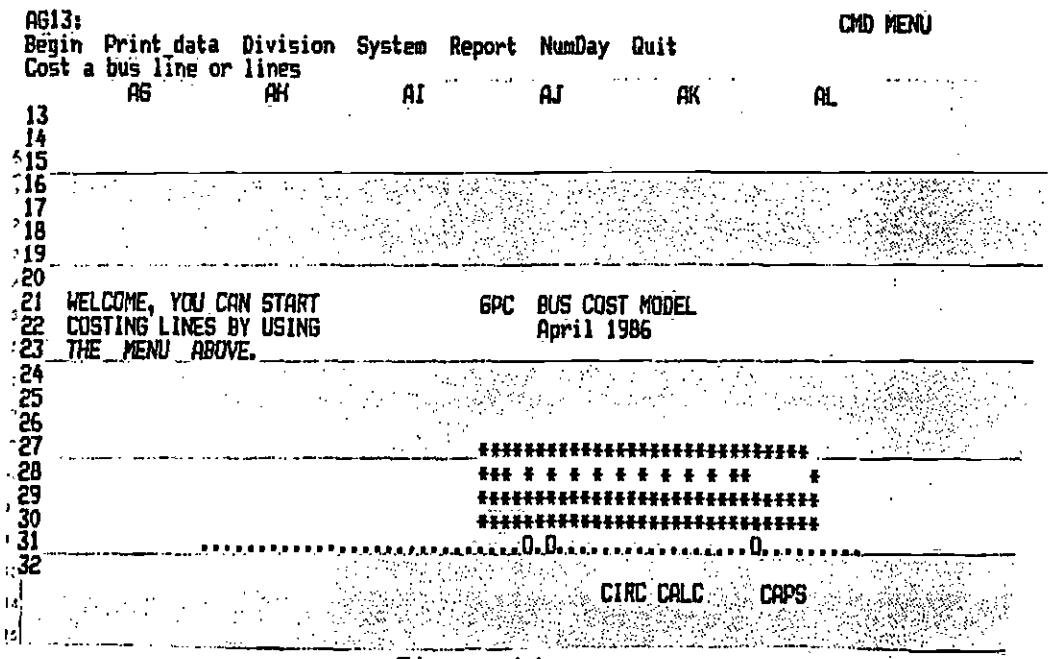


Figure 16.

HOW TO CHANGE A BUS LINE'S EXISTING LEVEL OF SERVICE

Load the model (/FRBUSCOST) to bring up the first screen. It will look like Figure 1, a cartoon bus which drives quickly across the screen and stops. Notice at the top of the spreadsheet screen is the following menu:

Begin Print data Division System Report Numday Quit
Cost a bus line or lines

This is the main menu of the program. Each item is described in the chapter entitled "Menu Options." To cost a new bus line, select the item Begin by moving the cursor to Begin using the direction keys and pressing the return key.

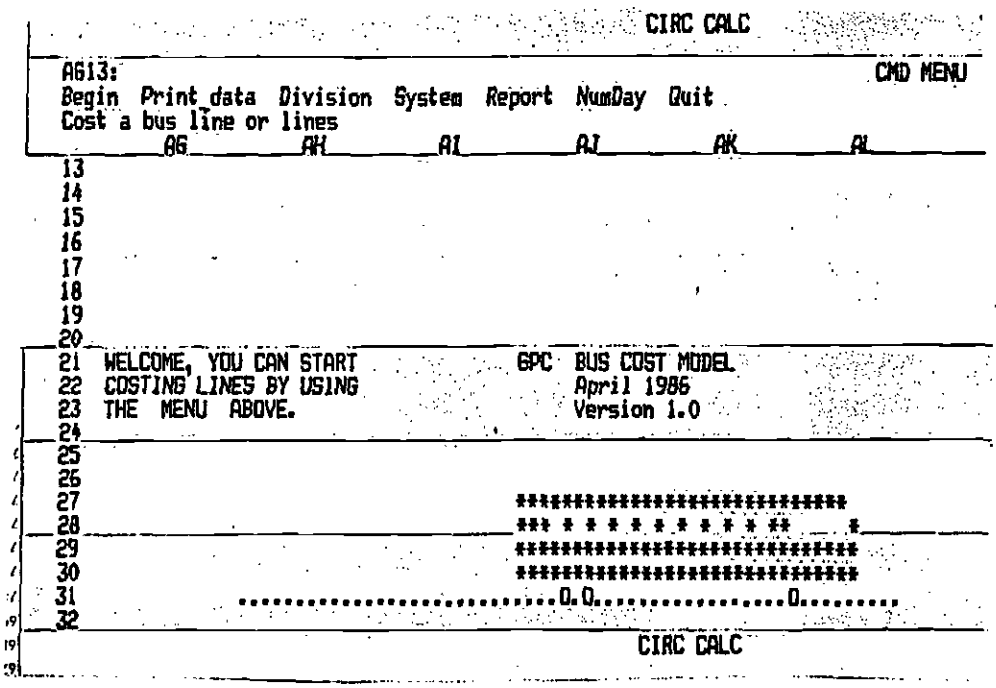


Figure 1

The second screen of the bus cost model now appears and asks whether you wish to cost the entire system (all bus lines in the data base). In this case the answer is no, you enter 0 and press return. This screen will look like Figure 2.

```
U132: 0                                                        CMD READY

      R         S         T         U         V         W
118
119
120 ************************************************
121                GPC Bus Cost Model
122                   April 1986
123
124
125
126
127
128
129
130 Do you wish to cost the total system for all lines ?
131
132 If yes then enter  1  here....)              0 *
133
134 On the next screen (bus line entry) just hit the return key
135 Enter no numbers.
136
137
```

Figure 2.

The next screen asks whether you wish to cost existing bus lines or proposed (new) lines. This screen will appear like Figure 3 below. Since you wish to cost existing lines, enter 0 and press return.

```
                                                          CIRC CALC

AQ30: 0                                                        CMD READY

        AM        AN        AO        AP        AQ        AR
 13
 14
 15
 16
 17
 18            DO YOU WISH TO COST EXISTING BUS LINES ?
 19            DO YOU WISH TO COST PROPOSED LINES ?
 20
 21
 22
 23
 24
 25
 26            TO COST EXISTING LINES TYPE   " 0 "
 27            TO COST PROPOSED LINES TYPE   " 1 "
 28
 29
 30            ENTER A "0" OR "1"  HERE .....)          0
 31
 32
```

Figure 3.

The next screen, Figure 4, is the bus line entry area. Enter the lines you wish to cost in this run.

For weekdays type WEEK
For Saturdays type SAT
For Sundays type SUN

If you wish to cost the line for all seven days you may just enter a * in the day column. If you wish to cost just Weekdays and Saturdays then you must type the following. Enter WEEK under the day column, then use the direction arrows (left and down) to move to the LINE column. Below the first line number reenter the same line number. Use the right direction arrow to move to the DAY column and enter SAT.

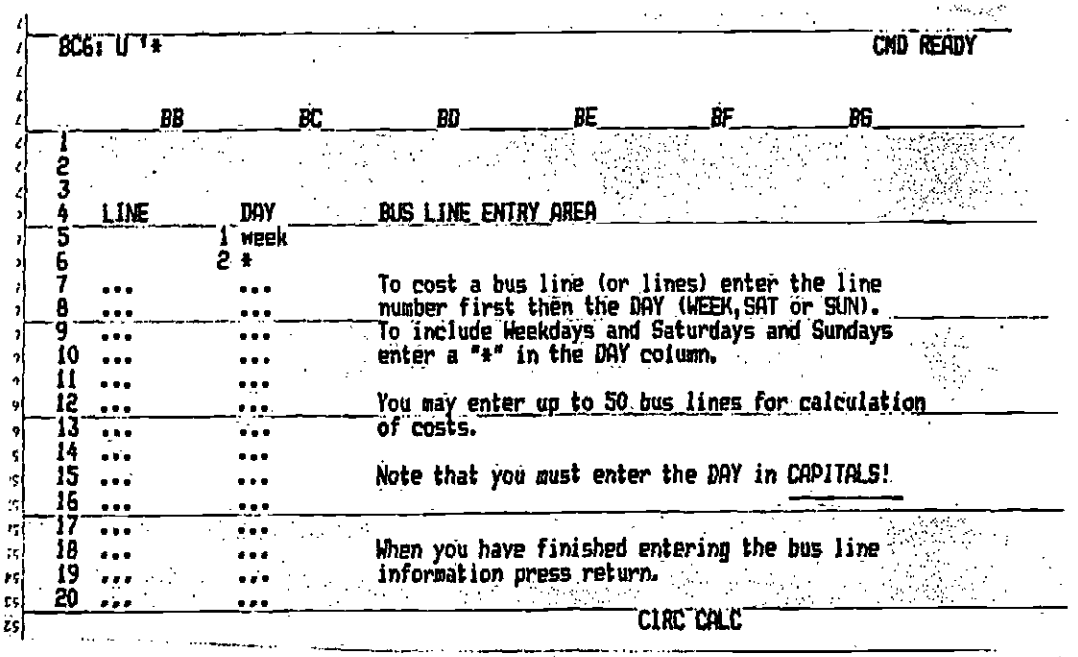


Figure 4.

IT IS IMPORTANT TO NOTE THAT YOU NEED TO HAVE THE CAPS LOCK KEY TURNED ON SO THAT THE ENTRIES IN THE DAY COLUMN ARE ALL IN CAPTIALS!!!!!

If any entry is not in all caps, you must change it now. Just press caps lock, then use the direction keys to move to those entries that must be changed. When the entry is correct, press return twice to move to the next screen.

The next screen informs you that the data base is being accessed. The program is searching the data base to find the level of service information for the specified Line number and day of week. Because the data base is large this takes about 1 minute, so please be patient.

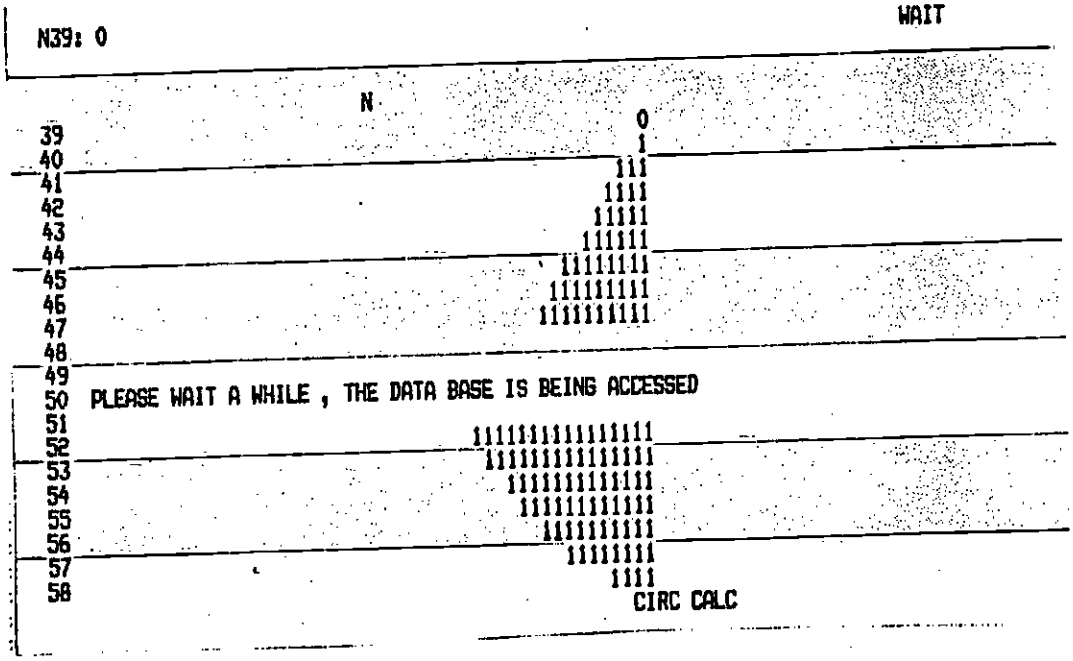


Figure 5.

The next screen (Figure 6) asks you if you wish to change the service on an existing bus line. To do so, enter 1.

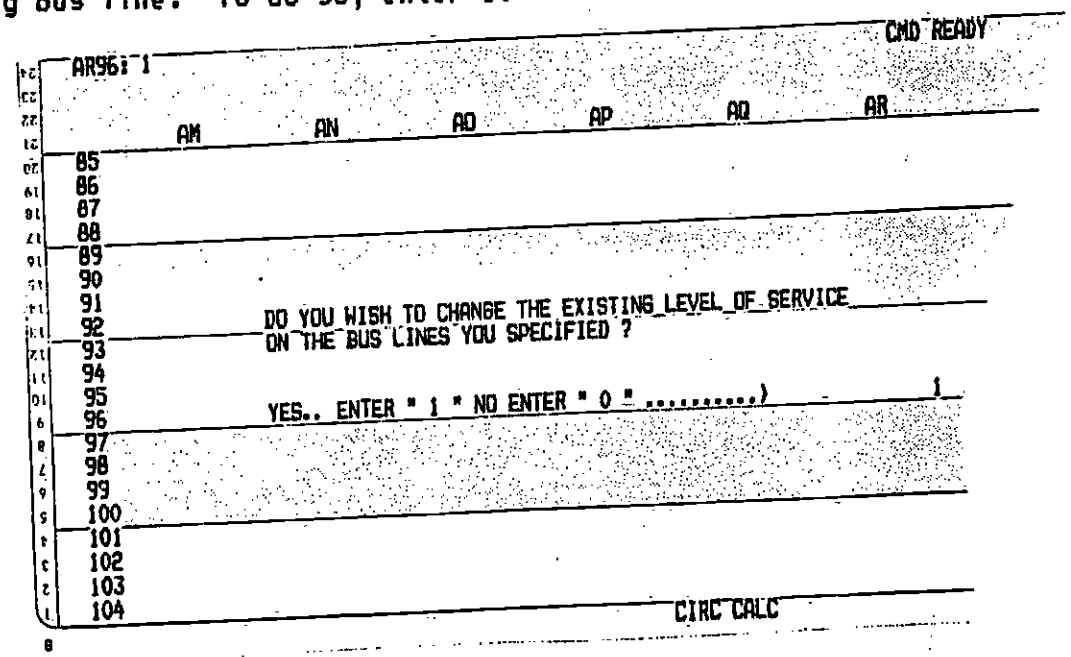


Figure 6

The next screen to appear is a table which displays existing levels of service and allows you to enter new data.

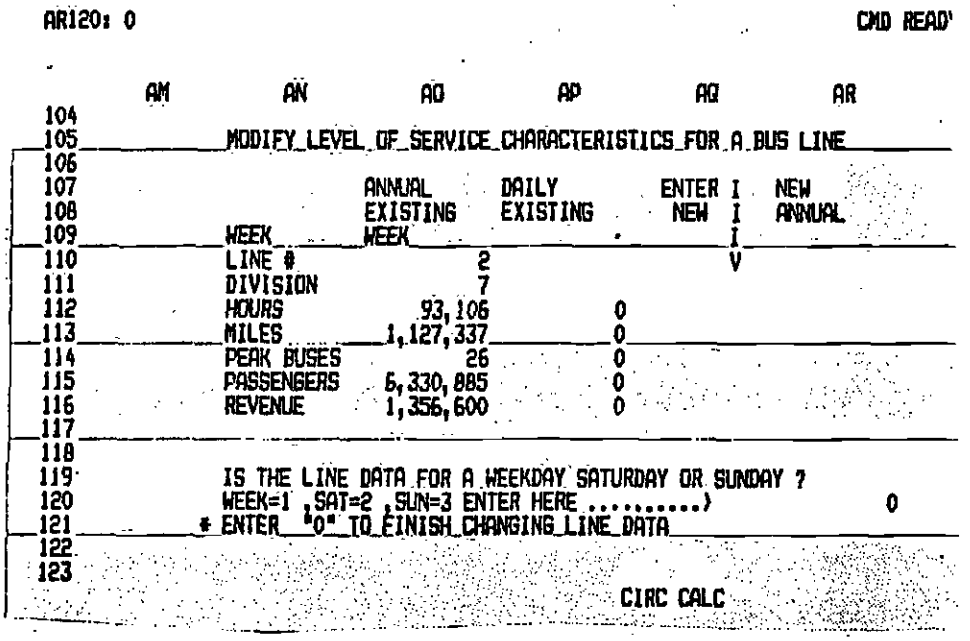


Figure 7.

To perform this function, you must first specify whether the service displayed is for weekdays, Saturdays, or Sundays. Simply read the prompt displayed directly under the label "annual existing" and enter the code number as follows:

WEEK = 1
SAT = 2
SUN = 3

After you have entered the day code (in this example 1 for weekdays), the model automatically calculates the existing daily service levels.

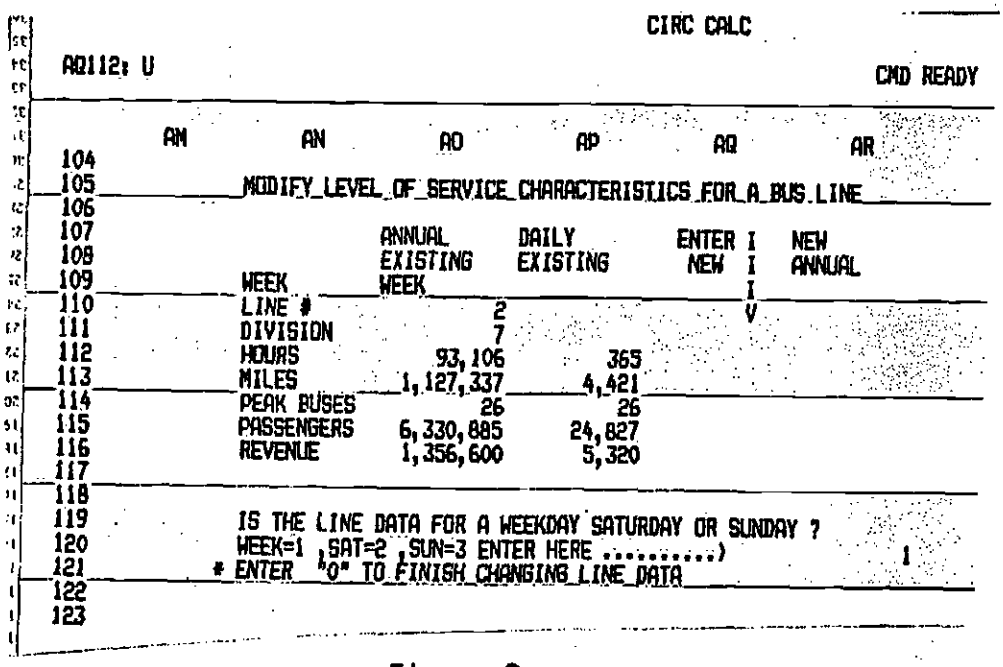


Figure 8.

Now enter the new daily sevice levels in the green data entry area. When the new daily levels have been entered, hit return to calculate the new annual service levels. The model will automatically enter the new data in the speadsheet and return ready for the next service change.

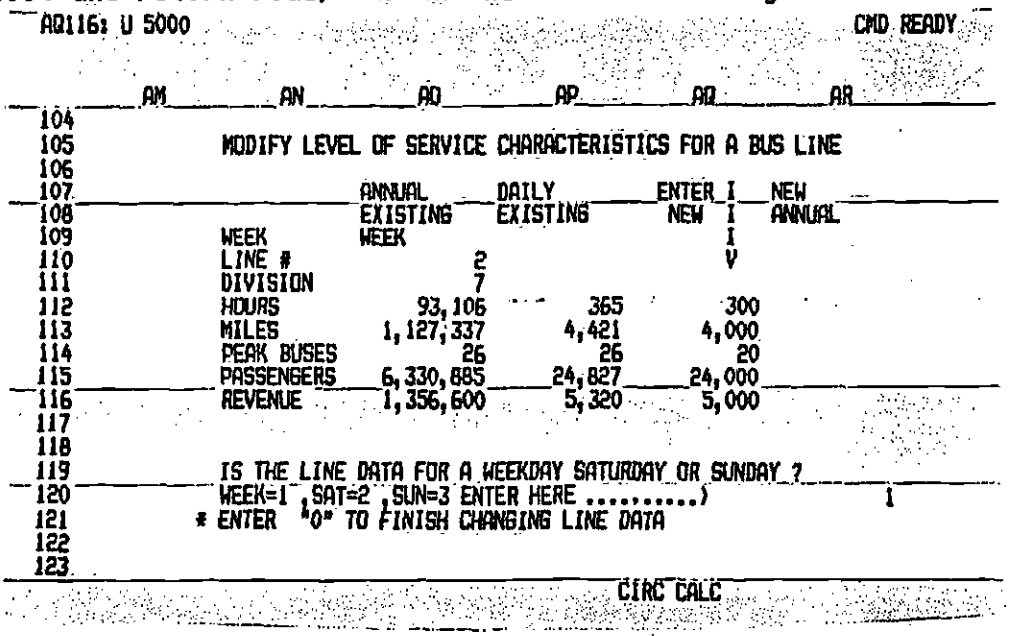


Figure 9.

When you have made all the desired service changes, enter 0 to continue on with the BUSCOST run.

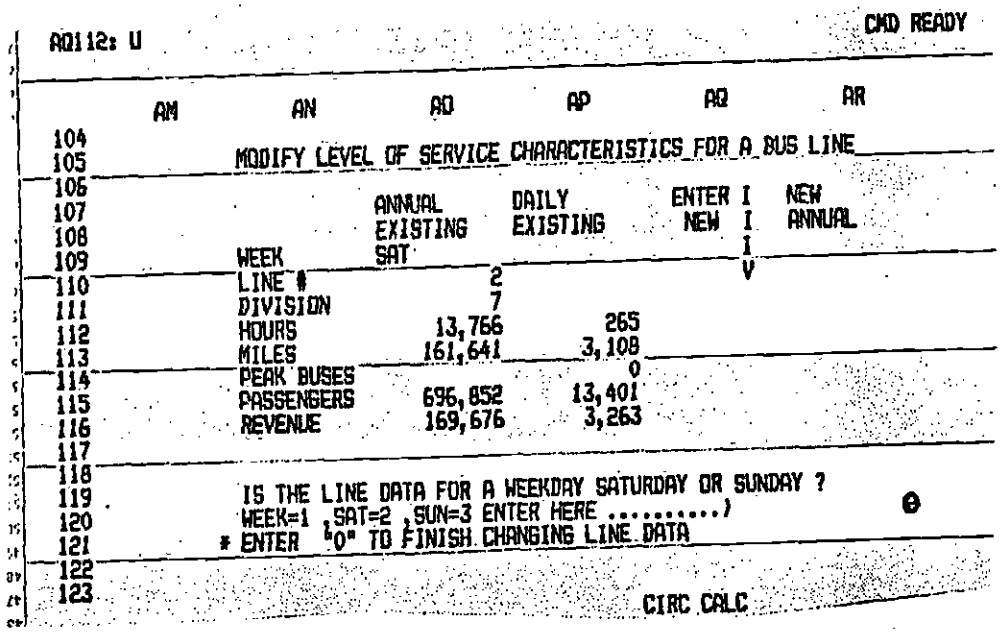


Figure 10.

Now the model asks you if you wish to run fully allocated costs. These are the fixed costs in the budget. If you do, enter 1 as in Figure 11.

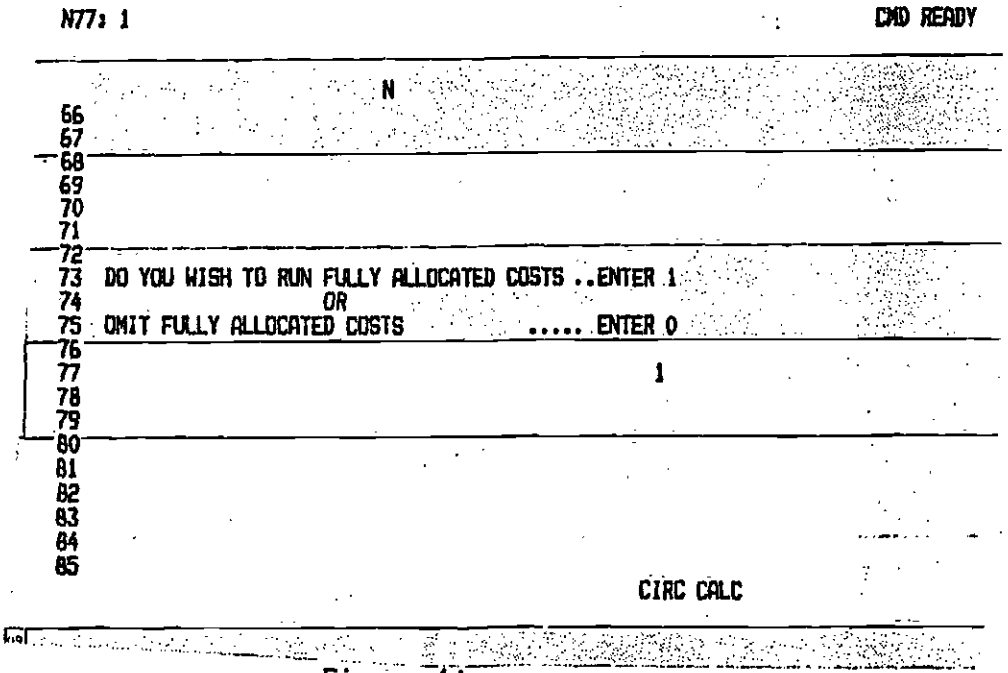


Figure 11.