Miami-Dade Transit
Metrorail Fleet Management Plan

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Director

December 2002

Revision II

Mission Statement

"To meet the needs
of the public
for the highest quality
transit service:
safe, reliable, efficient
and courteous

MIAMI-DADE TRANSIT
METRORAIL
FLEET MANAGEMENT PLAN

December 2002

This document is a statement of the processes and practices by which Miami-Dade Transit (MDT) establishes current and projected Metrorail revenue vehicle fleet size requirements and operating spare ratio. It serves as an update of the October 2000 Fleet Management Plan and includes a description of the system, planned revenue service, projected growth of the system, and an assessment of vehicle maintenance current and future needs.

Revisions of the October 2000 Fleet Management Plan contained in the current plan include:

- Service to meet the planned opening of the Palmetto Station and rail extension in late 2002
- New Standard Operating Procedure to allow vehicle testing on Metrorail Mainline during off peak passenger service is being routed for approval
- Use of a 6-car train standard as a service improvement to address overcrowding during peak periods
- Revised A & B-Interval Preventive Maintenance Schedules with assignment of hours saved to other maintenance activities including rebuilding low-rated G-inspection items
- A Work Plan developed to improve Mean Miles Between Service Failures
- Implementation of a rotation program to normalize vehicle mileage within the fleet
- Plans to complete a mid-life modernization of the vehicle fleet

Metrorail's processes and practices, as outlined in this plan, comply not only with Federal Transit Administration (FTA) Circular 9030.1B, Chapter V, Section 15 entitled, "Fixed Guideway Rolling Stock," but also with supplemental information received from FTA.

This plan is a living document based on current realities and assumptions and is, therefore, subject to future revision. The plan is updated on a regular basis to assist in the planning and operation of Metrorail.

The Fleet Management Plan is structured to present the demand for service and methodology for analysis of that demand in Section Two. Section Three of the plan addresses the supply of vehicles, explains the balance between the demand for and supply of vehicles, and summarizes the maintenance plan.

Table of Contents

List of Figures and Tables

List of Acronyms

ATC	Automatic Train Control
ATO	Automatic Train Operation
ATP	Automatic Train Protection
ATS	Automatic Train Supervision
ET	Electronic Technician
BRT	Bus Rapid Transit
DC	Direct Current
FEIS	Final Environmental Impact Statement
FSR	Fleet Spare Ratio
FTA	Federal Transit Administration
FY	Fiscal Year
HEFT	Homestead Extension of the Florida Turnpike
HVAC	Heating, Ventilation, and Air Conditioning
LRTP	Long Range Transportation Plan
M3	Materials Management & Maintenance Project
MDBF	Mean Distance Between Failures
MDT	Miami Dade Transit
MIC	Miami Intermodal Center
MIS	Major Investment Study
MLK	Martin Luther King, Jr. Station
MOS	Minimum Operable Segment
MPO	Metropolitan Planning Organization
OEM	Original Equipment Manufacturer
OSR	Operating Spare Ratio
PIP	Program of Inter-related Projects
PM	Preventive Maintenance
PTP	People's Transportation Plan
PVR	Peak Vehicle Requirement
SOP	Standard Operating Procedure
ST	Storage Track
TEA	Transit Equipment Administration System
TRI	Transit Rail Inventory
WLC	William Lehman Center

SECTION I: INTRODUCTION

Brief History

Metrorail, which began service in May 1984, is an elevated rapid transit system stretching from Kendall in the south to Palmetto[1] in the north. A customer can travel from one end of the system to the other in approximately 45 minutes. There are 22 stations located on the 22.9-mile double track, single line, electrically powered system, which operates 19 hours each day. Metrorail connects the following municipalities: Hialeah, Miami, Coral Gables and South Miami. Future development of the system identifies several extensions to the current system. The entire system, including those extensions and the William Lehman Center (WLC), is illustrated in Figure 1-1 and discussed in detail in Section II of this plan.

While Metrorail has a design capability of 70 mph maximum speed, it currently operates at a top speed of 58 mph to enhance savings through reduced energy consumption. Metrorail currently maintains an average speed of 31 mph.

During Fiscal Year (FY) 2000, Metrorail's unlinked passenger trips totaled 14,080,200 with an average weekday ridership of 47,237 passengers. Both unlinked passenger trips and average weekday ridership exceeded FY 1999 trips and ridership by 3.5% and 3.2%, respectively. FY 2000 ridership was higher than any year reported since FY 1996. Operating Recovery Ratio reached a rate of 22%, the same level reported as the previous high that occurred in 1997.

In FY 2001, the nearly 5 million Metrobus and Metromover transfers to Metrorail accounted for approximately 35% of total Metrorail boardings. Metrorail transfers of 3.7 million to Metrobus represented 5.7% of total Metrobus boardings, while Metrorail transfers of 1.1 million to Metromover resulted in 22.6% of total Metromover boardings.

Heavy, preventive, and running maintenance, cleaning, and storage of vehicles are accomplished at a single facility, WLC, located at the northern terminus of the right-of-way. Tail tracks on the southern terminus are used for interior cleaning and vehicle storage.

[1] Palmetto Station and rail extension is a new 1.4 mile expansion of the system from the previous northern terminus, Okeechobee Station, using existing railroad right-of-way, to the west side of Palmetto Expressway. The Palmetto Station extension is scheduled to begin revenue service in late 2002. It includes a passenger station and a surface parking facility that provides over 700 spaces. Service for the Palmetto Station extension will increase the Peak Vehicle Requirement by one six-car train. All Palmetto Station and rail extension service needs are included in this plan.

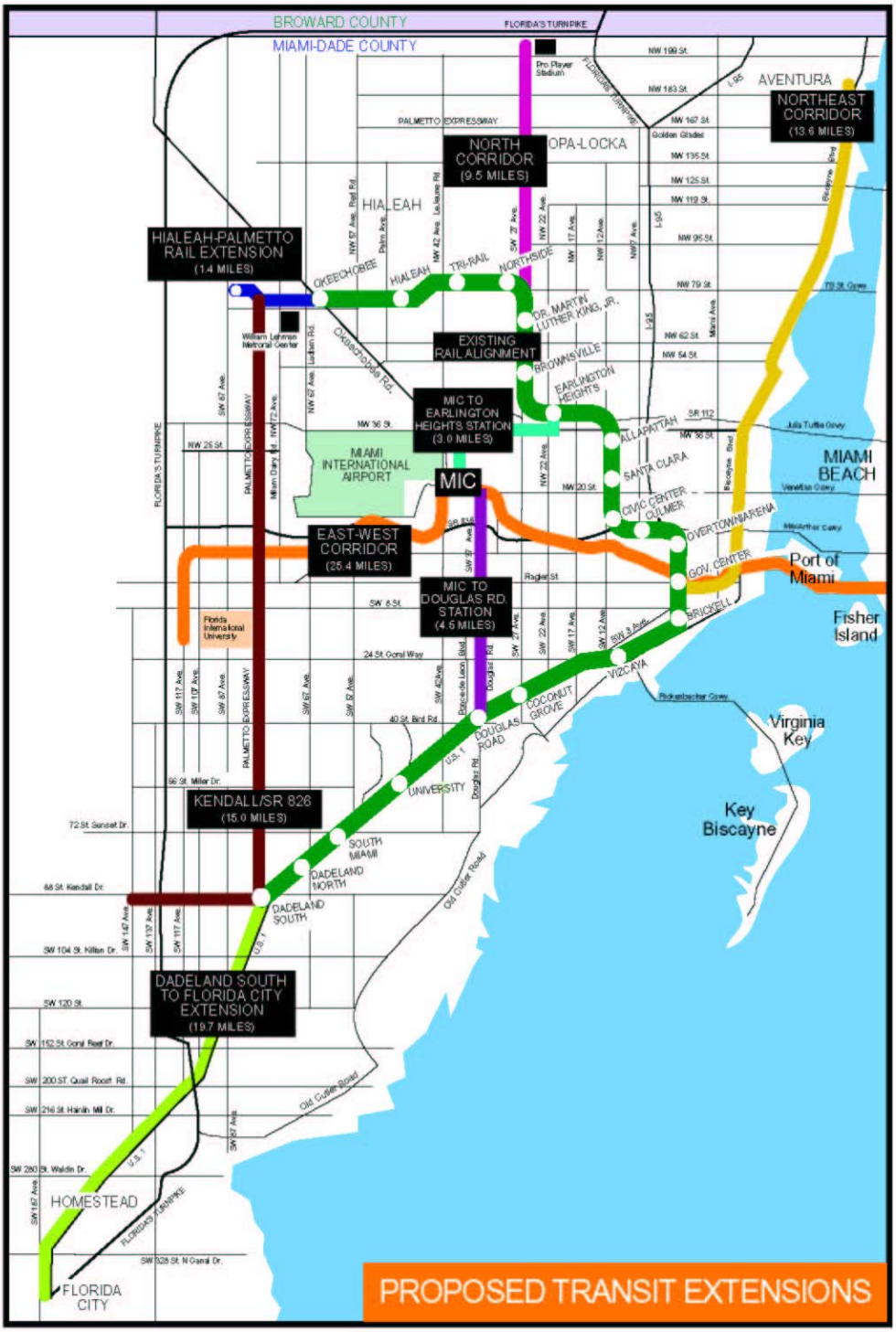


Figure 1-1 Metrorail System Map

Overview of Current Rail Car Fleet and Operating Practices

Current Rail Car Fleet

- MDT's Metrorail revenue car fleet consists of 136 Miami/Baltimore Transit vehicles manufactured by the Budd Company between 1982 and 1985. The revenue fleet entered service beginning in April 1984 with the last married pair received in April 1986.

- Each vehicle has a full passenger load of 166 riders. Seated passenger load equals 74, and the "crush" passenger load established by the original vehicle manufacturer is 275.

- Vehicles operate as a minimum of two-car units, referred to as "married pairs." There are two distinct types of cars designated A and B. Because certain types of equipment are shared between the cars, the cars must be operated in pairs of one car A and one car B. The A car contains communications/public address equipment and the air compressor unit for the consist. The B car contains the automatic train control (ATC) system equipment, automatic train operation (ATO) system equipment, a battery, and a low voltage power distribution system. Depending upon peak vehicle requirements, married pairs are coupled into four or six-car trains. All station platforms are capable of handling six-car trains. Three station platforms at Earlington Heights, Government Center, and Dadeland North can handle a maximum of eight-car trains.

- The primary propulsion for the vehicles is a 700-volt Direct Current (DC) third rail system.

A description of the current fleet is presented in Table 1-1. The date that each married vehicle pair entered service is listed in Table 1-2. A graphic illustration of the flow of the new 68 married pairs entering service over the 25-month cycle in which they were received is presented in Figure 1-2.

Layouts of the carbody shell, structure and underframe, and car configuration along with the front and rear ends are illustrated in Figures 1-3 through 1-6.

Table 1-1 Current Metrorail Rail Car Fleet

Number of Cars	**136**
Construction[2]	**Stainless steel body, Fiberglass "F" End (Front End) Cap**
Car Length	**75 feet**
Car Width	**10 feet 2 ½ inches**
Height	**12 feet 3 ½ inches from top of the running rails**
Empty Weight	**A-Car – 75,847 pounds** **B-Car – 75,536 pounds**
Maximum Speed	**70 mph**
Maximum Acceleration	**3.0 mphps**
Maximum Deceleration	**3.2 mphps**
Married Pair Configuration	**One A-car and One B-car**
Manufacturer	**The Budd Company**
Propulsion Type	**700 V DC Drive**
Date Purchased	**1983**
Date Received	**April 1984 – April 1986**
Series	**Miami/Baltimore Transit Vehicles**
Train Consist Minimum	**One Married Pair**
Train Consist Maximum[3]	**Up to Four Married Pairs**

[2] Vehicle information presented in Table 1-1 was obtained from OEM Vehicle Manual
[3] While train consist maximum equals up to 4 married pairs, only 3 of 22 stations are capable of handling a consist of 8 cars or 4 married pairs. All station platforms are capable of handling 6-car trains. Metrorail currently operates with a maximum consist of 6 cars or 3 married pairs.

Table 1-2 Metrorail Vehicle Service Dates

Vehicle Pair	Date Entered Service	Vehicle Pair	Date Entered Service
101-102	05/20/84	169-170	05/16/85
103-104	05/20/84	171-172	06/26/85
105-106	05/20/84	173-174	05/20/85
107-108	05/20/84	175-176	05/17/85
109-110	05/20/84	177-178	06/11/85
111-112	05/20/84	179-180	05/18/85
113-114	05/20/84	181-182	05/18/85
115-116	10/01/85	183-184	06/02/85
117-118	05/20/84	185-186	06/07/85
119-120	05/20/84	187-188	06/21/85
121-122	05/20/84	189-190	07/23/85
123-124	05/20/84	191-192	07/30/85
125-128	06/23/84	193-194	08/20/85
126-127	04/29/84	195-196	09/19/85
129-130	05/20/84	197-198	08/29/85
131-132	05/20/84	199-200	09/20/85
133-134	05/20/84	201-202	09/11/85
135-136	05/23/84	203-204	09/28/85
137-138	05/20/84	205-206	10/31/85
139-140	05/20/84	207-208	10/04/85
141-142	11/20/84	209-210	10/30/85
143-144	11/28/84	211-212	11/07/85
145-146	12/04/84	213-214	11/04/85
147-148	12/16/84	215-216	11/30/85
149-150	12/19/84	217-218	01/08/86
151-152	12/19/84	219-220	12/11/85
153-154	12/19/84	221-222	12/26/85
155-156	01/22/85	223-224	12/31/85
157-158	01/28/85	225-226	01/30/86
159-160	02/25/85	227-228	02/06/86
161-162	04/01/85	229-230	04/15/86
163-164	04/23/85	231-232	04/29/86
165-166	05/06/85	233-234	04/16/86
167-168	04/15/85	235-236	04/16/86

As indicated in Table 1-2, Metrorail vehicle service entry dates range from April 1984 through April 1986, a period of 25 months. The cumulative total of vehicles in service by month is illustrated in Figure 1-2. May 1985 marks the "in-service midpoint in time" for the first half of the fleet.

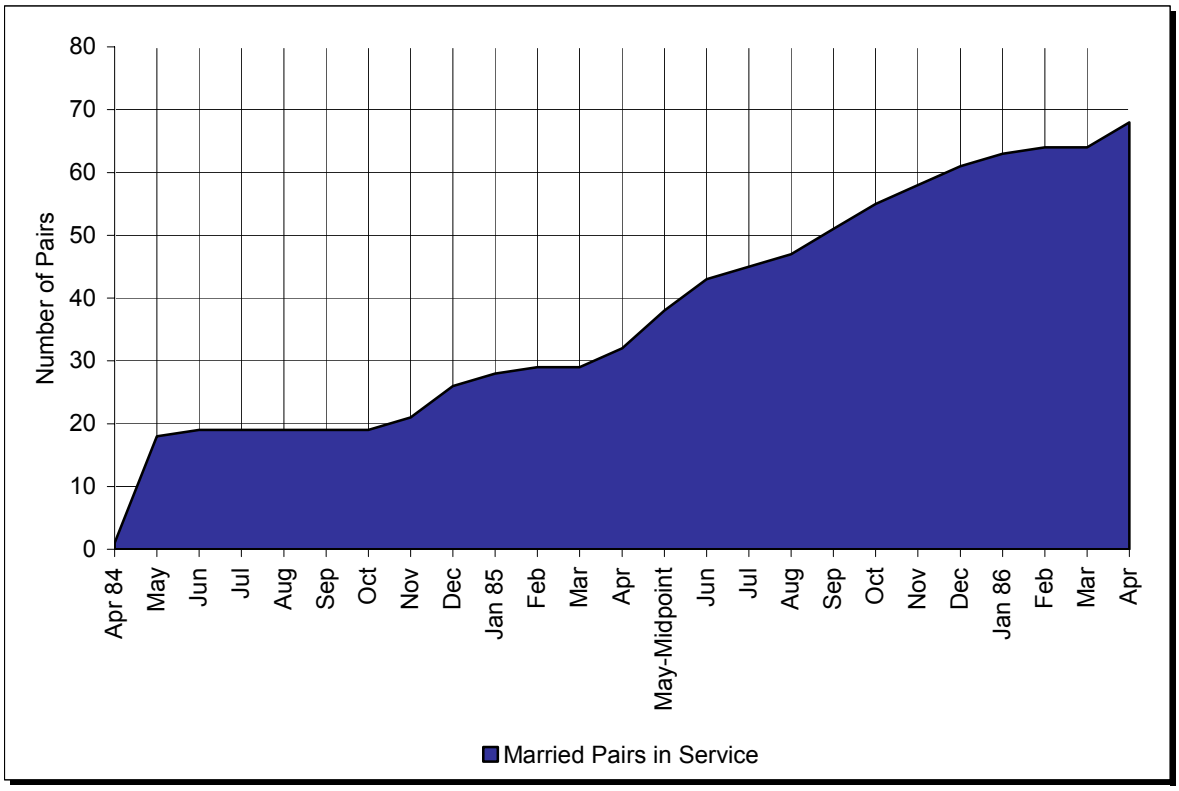


Figure 1-2 Married Pairs in Service

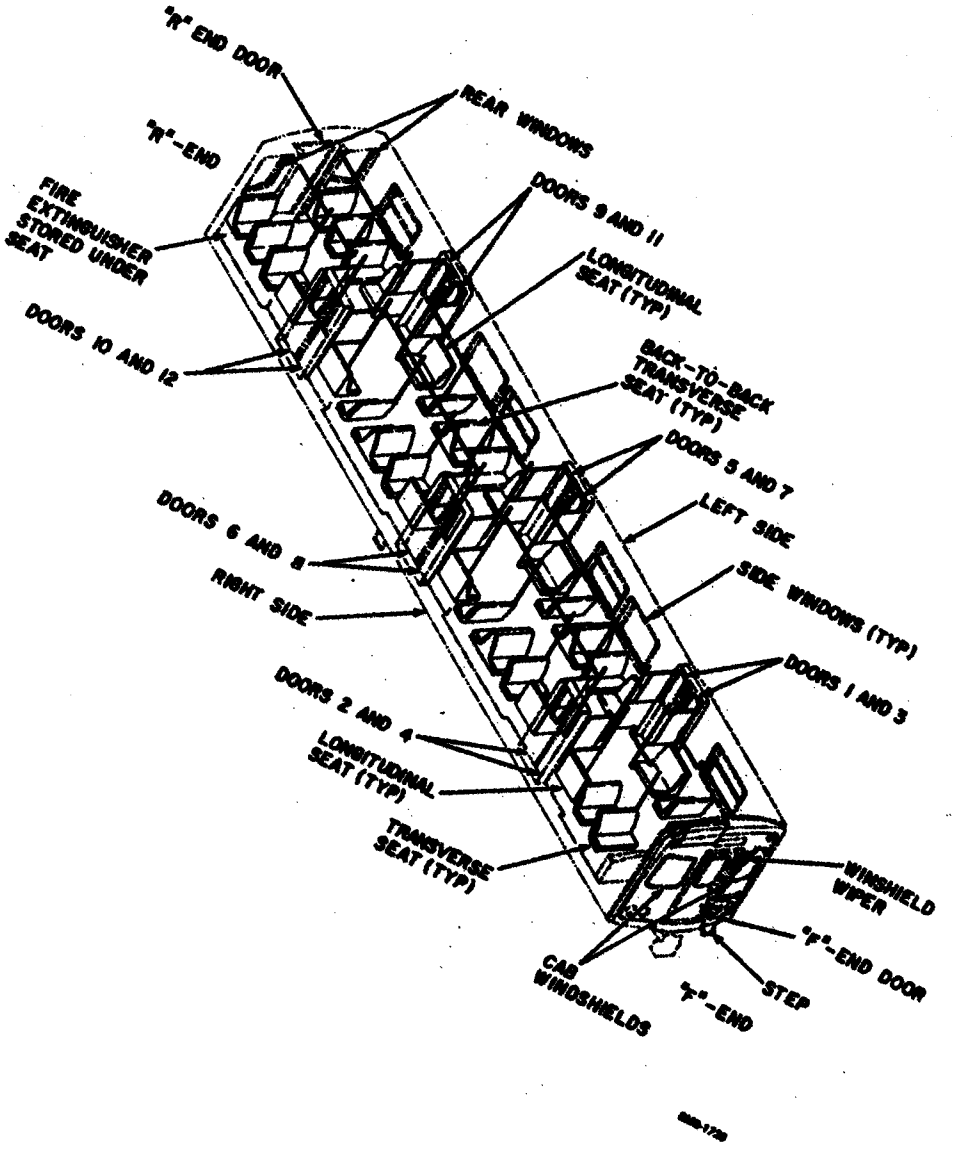


Figure 1-3 Carbody Shell

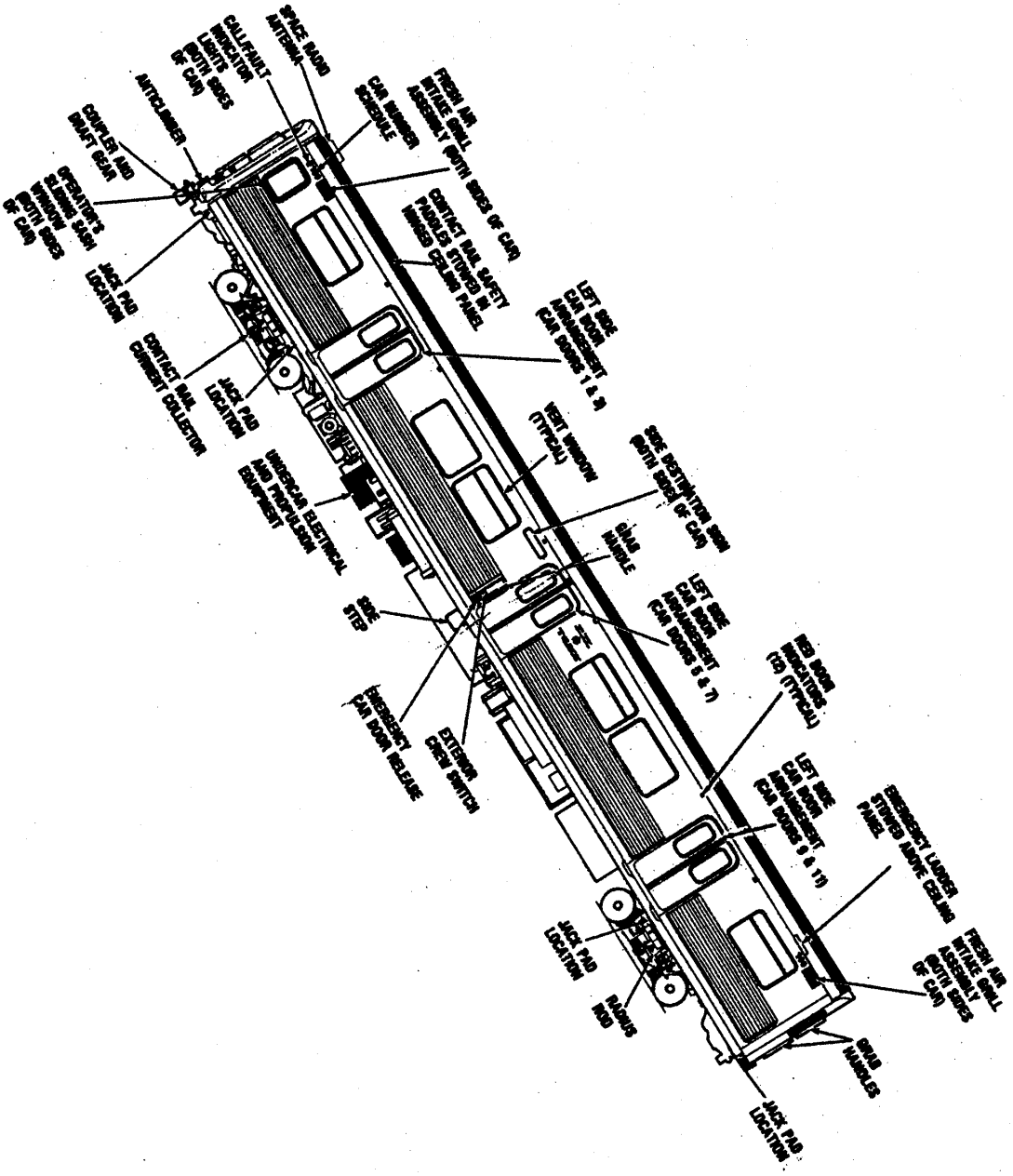


Figure 1-4 Car Configuration

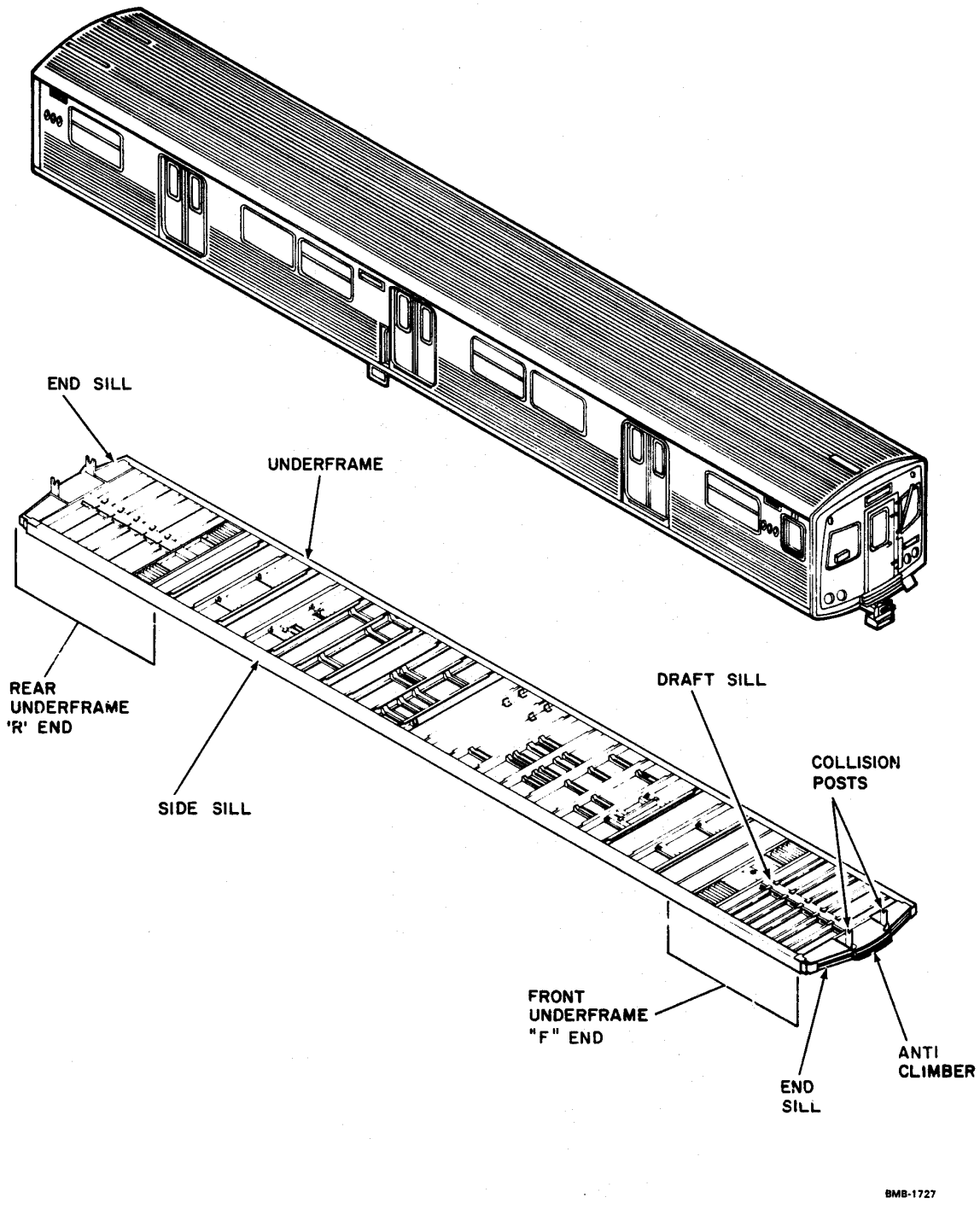
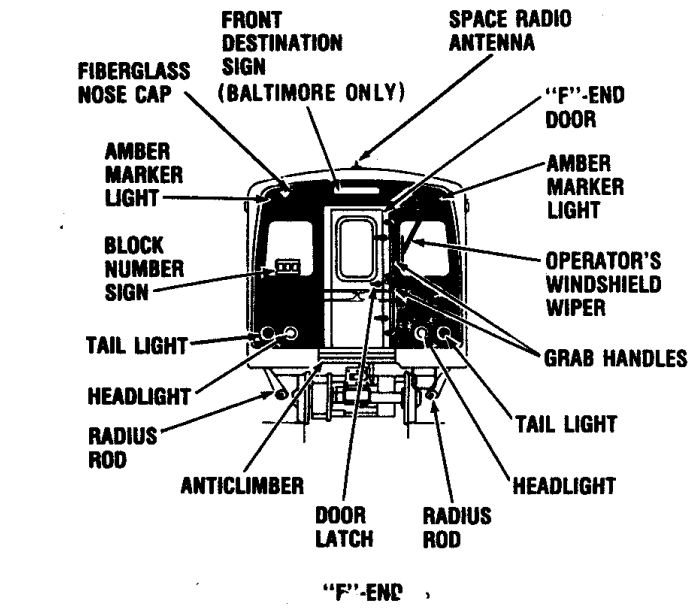


Figure 1-5 Carbody Structure and Underframe



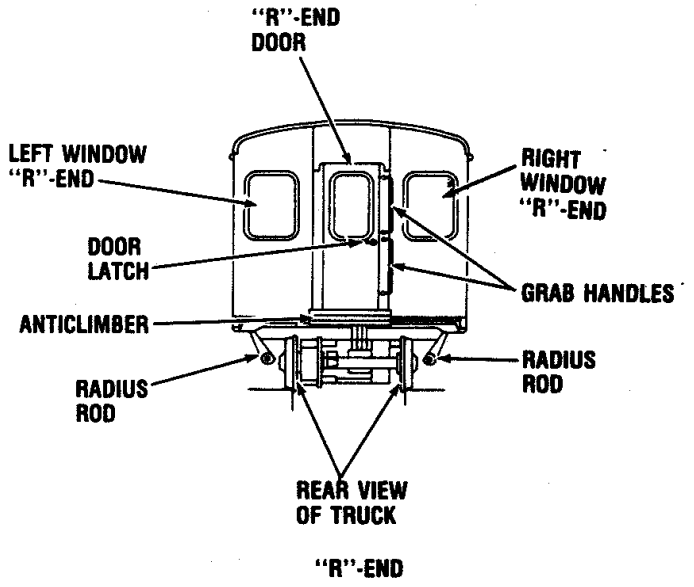


Figure 1-6 Car "F" End and "R" End

Current Rail Operating Practices

- Metrorail operates between the hours of 5:00 a.m. - 12:00 a.m. on weekdays and from 5:09 a.m. to 12:00 a.m. on weekends, and holidays. Some holidays require normal weekday service. Typical train arrival times are indicated in Table 1-3.

Table 1-3 Train Arrivals

Peak Period	*Hours*	*Trains Arrive At Station Every*
Weekdays		
Morning Base	5:00 am - 6:45 am	15 → 7 minutes
AM Peak	6:45 am - 8:45 am	6 minutes
Base	8:45 am - 3:45 pm	15 → 8 minutes
PM Peak	3:45pm - 5:45 pm	6 minutes
Base	5:45 pm - 7:00 pm	10 → 15 minutes
Evening	7:00 pm -12:00 am	20 → 30 minutes
Weekends and Holidays		
Base	5:09 am - 8:00 pm	20 minutes
Evening	8:00 pm - 12:00 am	30 minutes

Note: Operating peak periods and schedules are based on predetermined 45-minute service run times. Actual performance data may require headway and schedule adjustments.

- Metrorail drafted Standard Operating Procedure (SOP) 81.22-A to allow vehicle testing on the Metrorail Mainline during off-peak passenger service hours. The procedure is currently being routed for final approval. Training will be required for maintenance and transportation personnel prior to implementation, which is expected to occur by the end of the first quarter of 2002. A summary of the proposed procedure is as follows:
  - Testing must be accomplished without impact to passenger service.
  - Off peak hours for the purpose of vehicle testing include the following:
    - Weekdays between 9:30 a.m. and 2:00 p.m. and 7:30 p.m. through 4:00 a.m. when headways are 15 minutes or greater.
    - All day on Saturday, Sunday, and major holidays.
  - Trains with the following anomalies are not tested during revenue service:
    - ATP in Bypass
    - Less than 100% friction braking
    - ATP C Inspections
    - Vehicles requiring doors to be opened at stations
    - Inoperative air compressors

  - Test trains are composed of a minimum of four (4) cars and a maximum of six (6) cars.
  - The Vehicle Maintenance Supervisor on duty must certify one married pair of the consist scheduled for testing as ready for revenue service prior to leaving WLC.

- Facilities system maintenance, and other non-revenue activities can occur 24 hours a day, 7 days a week.

- Under normal conditions, all stations are serviced. The Tri-Rail Station is not serviced when Tri-Rail is closed.

- After maintenance or any other activity requiring assurance that the guideway is clear and ready for normal operation, Central Control implements a sweep of any affected area. Train operation is in manual mode not exceeding 28 mph and is a non-revenue (light) train. A copy of *DRAFT SOP 81.48: Metrorail Mainline Sweep Train Procedure* is included as Appendix A.

- Central Control operates 24 hours a day, 7 days a week to ensure supervision, control, communications, and coordination of the Metrorail Mainline Operation. It is responsible for all revenue and non-revenue train movements made on the Mainline, including the Tail Track to the Yard Limits.

- The WLC Yard Tower is staffed 24 hours a day, seven days a week to ensure supervision, control, communications and coordination of Metrorail Yard Limits Operations. All movement of trains to the maintenance shop and wash area, except for non-signaled/non-powered maintenance of way tracks, is controlled through the Yard Tower.

SECTION II: REVENUE VEHICLE DEMAND

Quality of Service

MDT is committed to providing a safe and reliable transportation system. The safety of the public and MDT employees is of primary concern to all Metrorail personnel. When service is interrupted, every attempt is made to restore that service with minimal disruption to the customer. Train Control and Traction Power personnel remain on standby; Rail Vehicle Electronic Technicians rove the system; and, failure management trains are readily available in case of any malfunction requiring removal of a train from service. Any vehicle that fails is moved to the nearest pocket track, tail track or yard to maintain service on the mainline.

A 2000 Tracking Study of Metrorail rail-only riders found that 26% of riders were transit-dependent. This percentage showed a rather sharp increase from the 1997 level of 17% who were transit-dependent. For Metrorail, this means that a larger segment of customers relies on transit services to meet transportation needs.

Reliability of Metrorail for those passengers is critical in meeting their needs. Rail-only riders who were not transit-dependent reported that convenience, stress reduction, and savings of driving and parking expenses were their primary reasons for using Metrorail. The high percentage of riders that have a choice compels MDT to provide high quality, reliable service to continue to attract those riders.

The Tracking Study also reported that 83% of rail-only riders were satisfied or very satisfied with Metrorail service. This number is up from the 80% who were satisfied or very satisfied with Metrorail service in 1997.

Metrorail is committed to providing high quality service. With 74% of rail-only riders not dependent upon transit to meet their transportation needs, quality of service is the key to retaining and growing ridership in this market segment. Rail ridership has shown a gradual increase during the last five years, and along with that growth, more riders have reported a higher level of satisfaction with the quality of that service. Metrorail's continued focus on safety, speed, cleanliness, frequency, comfort, and reliability to insure the quality of the service provided is reflected in riders' satisfaction levels. Frequency, comfort and reliability factors are related primarily to fleet size and serve as the grounding for Metrorail's commitment to customer sensitive load factors.

On-time performance is critical to customer satisfaction. Metrorail considers a train to be on-time if it leaves the station no more than 30 seconds before the scheduled departure time and no more than 150 seconds after the scheduled

departure time. Figure 2-1 represents Metrorail's on-time performance during the past 18 months. Since December 2000, Metrorail has shown a significant improvement in on-time performance, not only in achieving the 97% target but also in establishing a positive trend.

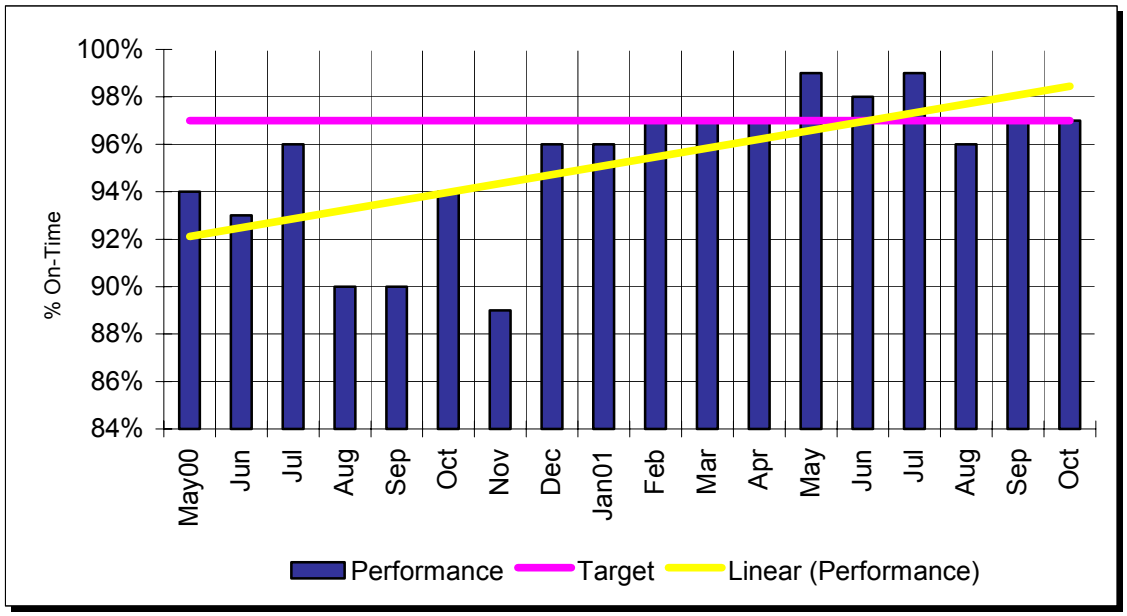


Figure 2-1 Metrorail On-Time Performance

May 2000 – October 2001

Quality of service and public opinion also impact service expansions and were factors in the construction of the new Palmetto Station and rail extension. An assessment of potential ridership was conducted in the area of the new extension that is adjacent to a major north-south road, the Palmetto Expressway, State Road 826. Palmetto Expressway has a level of service E and is identified in the 2015 Long Range Transportation Plan as in need of premium transit service. A high volume of private vehicles uses the road, and chronic congestion occurs during peak hours. Potential ridership was determined to be high. Furthermore, no major residential or business disruptions were projected to occur during the construction period.

SECTION II-A: ESTIMATION OF PASSENGER DEMAND AND RESULTING PEAK VEHICLE REQUIREMENTS

Passenger Demand

Passenger load checks are conducted on a quarterly basis to determine the actual passenger loads per trip at the maximum load points. These points are at the Vizcaya station in the morning peak and the Brickell station in the afternoon peak. In addition, once a month, station turnstiles at each Metrorail station are read periodically throughout the day to determine the boardings per time period. Passenger load data are compared with MDT's Service Guidelines to determine the level of service to meet passenger demand. The schedule is developed based on weekday headways of six minutes in the peak period and fifteen minutes in the midday.

General Ridership Growth

Weekday and weekend ridership have remained relatively constant since 1994 when peak period service frequencies were reduced from 5 minutes to 6 minutes. Figure 2-2 represents annual ridership growth for average weekday, Saturday, and Sunday boardings from FY 1985 through FY 2001.

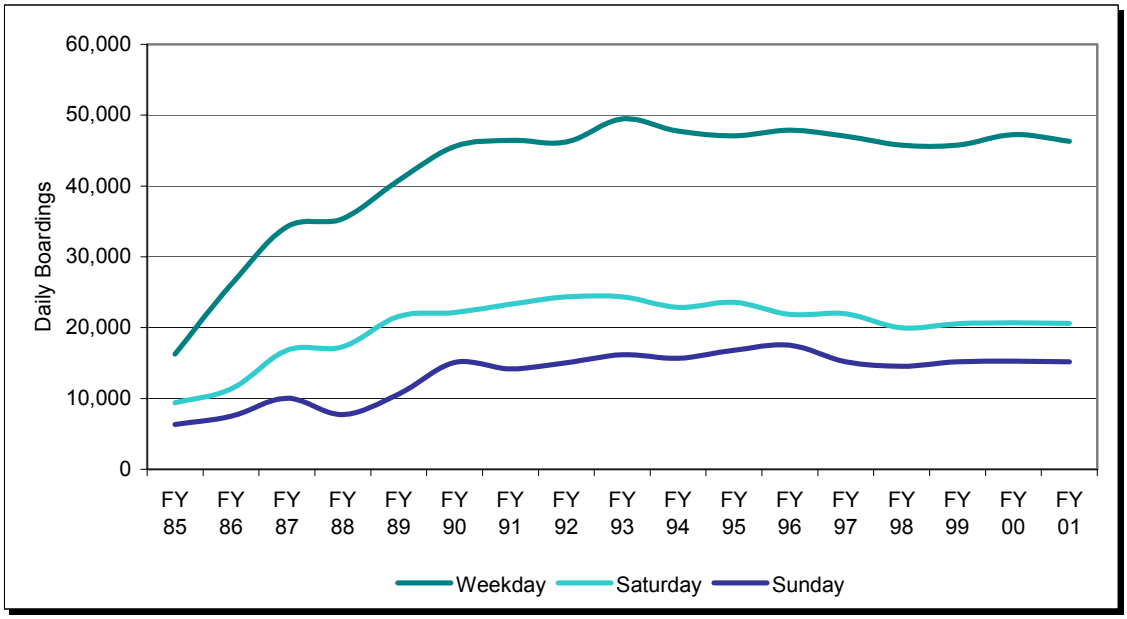


Figure 2-2 Average Daily Boardings, FY 1985 – FY 2001

Weekday, Saturday & Sunday

Annual boardings are represented in Figure 2-3. It does not appear that general growth is a factor that will necessitate an increase in the current fleet size.

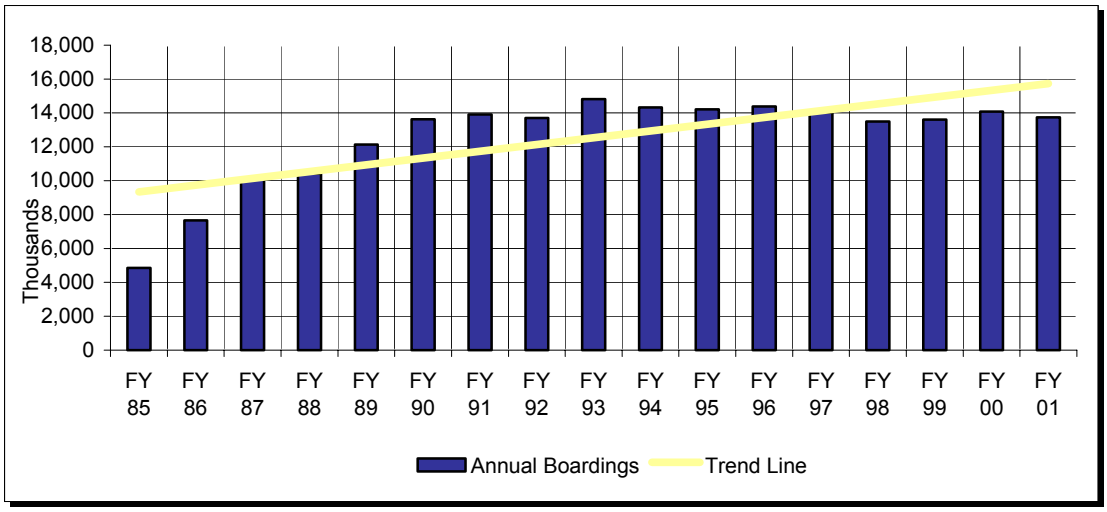


Figure 2-3 Metrorail Total Annual Boardings

FY 1985 – FY 2001

Seasonal Variation in Passenger Demand

Several years ago, MDT reduced car requirements from six-cars to four-cars on some peak trains during the summer months in response to reduced demand. Seasonal variation in passenger demand as illustrated in Figure 2-4 shows that in recent years there has actually been less fluctuation in passenger demand from a seasonal perspective. Furthermore, Metrorail passengers indicate a strong preference for consistent train length to facilitate loading, unloading, and passenger-flow through stations. As a result, weekday peak vehicle requirements, configured as six-car trains, remain the same throughout the year unless the peak headway is changed.

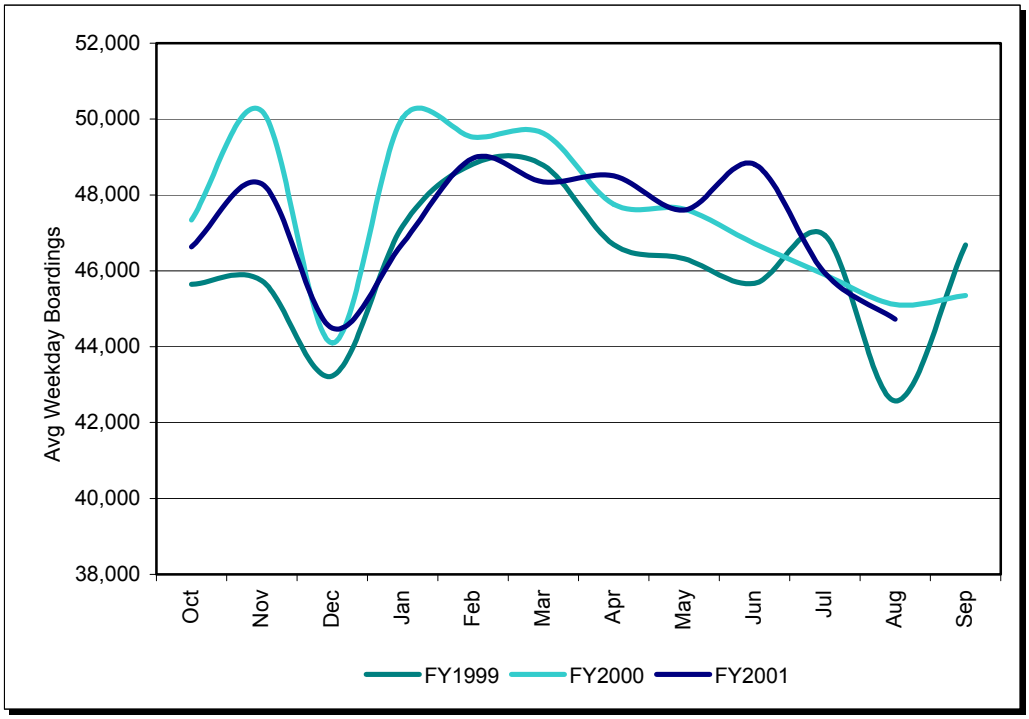


Figure 2-4 Seasonal Variation in Passenger Demand

October 1999 – August 2001

Estimates of Future Demand

Demand estimates for premium transit services are developed through the periodic updating of the Miami Urbanized Area Long Range Transportation Plan (LRTP) and the use of mathematical models to ascertain daily trips taken by the population at large. Estimates taken into account include the area's population projections as well as the mix of various residential, commercial, and industrial land uses in the region, including other socio-economic factors, such as household income, education levels, auto ownership and/or availability, the location of major attractions or destinations, and employment centers.

Passenger demand is influenced not only by socio-economic factors, e.g., income levels and private automobile availability, but also by other factors such as weather, pricing of fares, retail price of fuel, and transit system reliability.

Passenger Load Standards

The passenger load standard is the desired number of passengers per car under maximum load conditions. MDT has established a load factor of 1.00 (74 seated passengers per car) as the standard. The passengers per seat figures are

calculated by dividing the passengers per car figures by 74. Table 2-1 shows the passenger load factor conversion. Passenger load standards affect not only passenger comfort but also operating efficiency, each of which is important in terms of quality of service. Loading guidelines are intended to balance passenger comfort with operating costs and do take into consideration passenger preference for consistent train length. Passenger load standards have been developed to define acceptable passenger loads at different times of the day to help ensure acceptable levels of passenger comfort and operating efficiency.

The loading guidelines are applied and service is adjusted through the continuous performance monitoring process conducted by Service and Mobility Planning Division.

Table 2-1 Passenger Load Factor Conversion

Passengers Per Car	*Load Factor*	*Passengers Per Car*	*Load Factor*	*Passengers Per Car*	*Load Factor*	*Passengers Per Car*	*Load Factor*
123	1.66	98	1.32	73	0.99	48	0.65
122	1.65	97	1.31	72	0.97	47	0.64
121	1.64	96	1.30	71	0.96	46	0.62
120	1.62	95	1.28	70	0.95	45	0.61
119	1.61	94	1.27	69	0.93	44	0.59
118	1.59	93	1.26	68	0.92	43	0.58
117	1.58	92	1.24	67	0.91	42	0.57
116	1.57	91	1.23	66	0.89	41	0.55
115	1.55	90	1.22	65	0.88	40	0.54
114	1.54	89	1.20	64	0.86	39	0.53
113	1.53	88	1.19	63	0.85	38	0.51
112	1.51	87	1.18	62	0.84	37	0.50
111	1.50	86	1.16	61	0.82	36	0.49
110	1.49	85	1.15	60	0.81	35	0.47
109	1.47	84	1.14	59	0.80	34	0.46
108	1.46	83	1.12	58	0.78	33	0.45
107	1.45	82	1.11	57	0.77	32	0.43
106	1.43	81	1.09	56	0.76	31	0.42
105	1.42	80	1.08	55	0.74	30	0.41
104	1.41	79	1.07	54	0.73	29	0.39
103	1.39	78	1.05	53	0.72	28	0.38
102	1.38	77	1.04	52	0.70	27	0.36
101	1.36	76	1.03	51	0.69	26	0.35
100	1.35	75	1.01	50	0.68	25	0.34
99	1.34	74	1.00	49	0.66	24	0.32

Service Planning Model

The major factors considered in the service planning guidelines for MDT's Metrorail service are those associated with schedule design. Schedule design entails the span and frequency of service as well as loading factors. Criteria for schedule design are used in establishing or re-establishing the scheduled interval between trains in addition to the hours during which the trains operate. The elements include span of service, frequency of service, and loading factors.

Span of Service and Peak Periods

Peak periods are designated from 6:45 a.m. to 8:45 a.m. and from 3:45 p.m. to 5:45 p.m. Base service is operated in the morning from 5:00 a.m. to 6:45 a.m. and during midday from 8:45 a.m. to 3:45 p.m. Evening service runs from 7:00 p.m. to 12:00 a.m. Table 2-2 shows the passenger load points during the AM peak traveling northbound at Vizcaya and the PM peak traveling southbound at Brickell based on 2001 data obtained by the Service and Mobility Planning Division. Peak period ridership is the primary factor in the determination of the Peak Vehicle Requirement.

Table 2-2 Metrorail Passenger Load Factors

	Time Period	*Trains*	*Average Total Passengers*	*Passenger Load Factor*
AM Peak Northbound Maximum Load Point VIZCAYA 2001	6:00-6:18	2	462	0.43
	6:31-6:53	3	901	0.74
	7:01-7:25	5	1,382	0.82
	7:31-7:55	5	1,917	0,98
	8:01-8:25	5	1,867	0.94
	8:31-8:55	5	1,638	0.99
	9:01-9:28	4	892	0.64
	9:38-9:58	3	369	0.44
	10:13-10:28	2	262	0.49
PM Peak Southbound Maximum Load Point BRICKELL 2001	3:01-3:29	3	704	0.60
	3:37-3:53	3	667	0.43
	4:01-4:27	5	1,281	0.73
	4:33-4:57	5	1,668	0.81
	5:03-5:27	5	1,992	0.94
	5:33-5:57	5	1,434	0.90
	6:03-6:19	3	870	0.83
	6:29-6:54	3	884	0.85
	7:09-7:24	2	353	0.59

Frequency of Service

Rail headway is defined as the interval of time between trains traveling in any given direction. Factors considered when adjusting rail frequencies include:

- Number of cars available
- Load factors
- Passenger demand
- Route length
- Running time
- Attraction of new riders

When loading guidelines are consistently exceeded, additional trains are added. Table 2-3 summarizes the maximum passenger load factor guidelines for Metrorail service operating in the normal scheduled service.

Table 2-3 Metrorail Maximum Load Factor Guidelines by Time Period

Headway (minutes)	*Single Trip*	*Peak*	*Midday/ Weekend*	*Night*
1 – 10	200%	145%	125%	110%
11 – 30	200%	104%	110%	100%

Passenger Service Car Requirements

Metrorail provides passenger service over a 22.9-mile guideway consisting of an elevated double track and three grade level areas at Palmetto Rail, Culmer and I-95 hi-rail access. Twenty-one of the twenty-two stations are elevated. There are seven double crossovers and three pocket tracks. Pocket tracks may be used for temporary storage, turn-back, and failure management. Pocket tracks at Douglas Road and I-95 hold eight cars, and Earlington Heights holds 10 cars. The Metrorail system also has two tail track areas: Dadeland South Tail Track holds up to sixteen cars while the Palmetto tail track can hold up to twelve cars.

Pocket Track locations are identified in Figure 2-5.

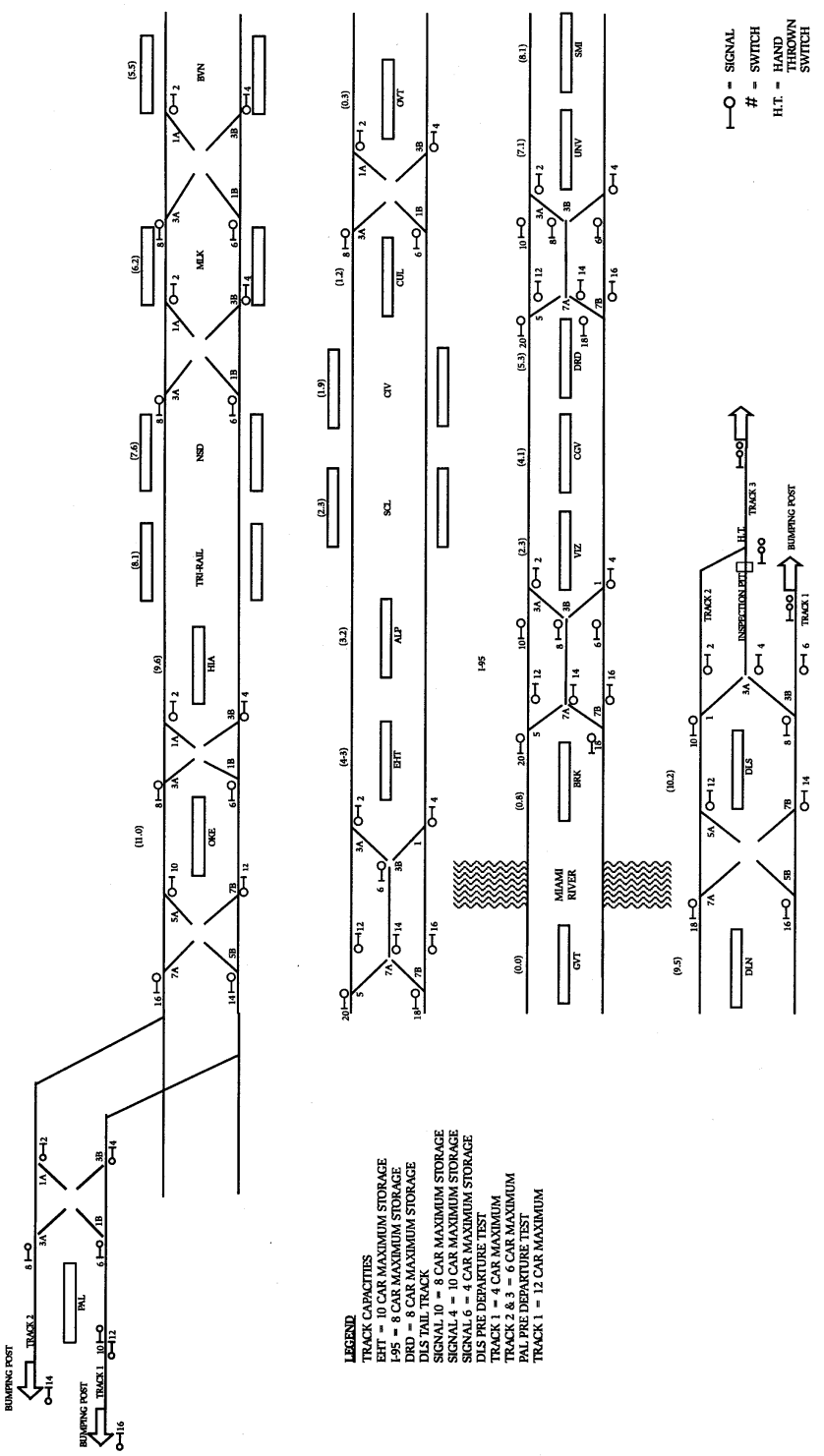


Figure 2-5 Mainline Diagram of Metrorail Interlockings, Switches, Signals, Mile Post Markers, and Tail Track Train Capacity

All trains for passenger service are dispatched from WLC Yard. Preparation for passenger service requires trains to be dispatched to the Dadeland South and Palmetto Tail tracks for initiation of service from the terminal stations.

Service level drives operating requirements. Train requirements based on a variety of service headways are outlined in Table 2-4. Service headways and passenger volumes dictate the need for frequency of service and the configuration of trains in terms of 4-car or 6-car consists. Service headways and train configuration, which are adjusted as necessary to ensure the provision of high quality service to Metrorail customers, often vary based on time of day and day of week. Shorter service headways with larger consists are typically used during peak periods on weekdays (6-minute headways with 6-car consists) to move the higher volumes of passengers while longer headways with shorter consists are able to serve passenger volumes during nonpeak weekend hours of service (20-minute headways with 4-car consists). A service headway of 4-minutes with 4-car consists requires the same number of cars as a service headway of 6-minutes with 6-car consists.

Table 2-4 Vehicle Requirements

Operating Requirements			
Service Headway in Minutes	***# Trains***	***4-Car Trains***	***6-Car Trains***
2	47	188	282
3	32	128	192
4	24	96	144
5	19	76	114
6	16	64	96
7.5	13	52	78
10	10	40	60
12	8	32	48
13	8	32	48
15	7	28	42
20	6	24	36
30	4	16	24

Note: MDT uses “clock-face headway” where service frequency must be an even divisor of 60 (minutes) except when a combination of alternating 7-minute and 8-minute headways is used, resulting in a 7.5-minute service headway.

Table 2-5 translates car requirements based on varying headways outlined in Table 2-4 into passenger volumes. MDT has established a passenger load factor of 1.00 (74 seated passengers per car) as the standard. Based on that standard, over 7,000 passengers can receive service using either 4-car consists

with 4-minute headways or 6-car consists with 6-minute service headways. Increasing the passenger load factor to 1.24 or 1.50, as shown in Table 2-5, increases the amount of time between headways and reduces car requirements; nonetheless, increasing the passenger load factor entails quality of service issues. With a passenger load factor of 1.00, all 74 passengers are seated, while a passenger load factor of 1.24 requires 18 passengers to stand and a load factor of 1.50 requires 37 passengers to stand.

Table 2-5 Passenger Volumes Based on Load Factor

Service		# Cars		Passenger	Total Passengers		Passenger	Total Passengers		Passenger	Total Passengers	
Headway (minutes)	# Trains	4-Car Trains	6-Car Trains	Load Factor	4-Car Trains	6-Car Trains	Load Factor	4-Car Trains	6-Car Trains	Load Factor	4-Car Trains	6-Car Trains
2	47	188	282	1.00	13,912	20,868	1.24	17,296	25,944	1.50	20,868	31,302
3	32	128	192	1.00	9,472	14,208	1.24	11,776	17,664	1.50	14,208	21,312
4	24	96	144	1.00	7,104	10,656	1.24	8,832	13,248	1.50	10,656	15,984
5	19	76	114	1.00	5,624	8,436	1.24	6,992	10,488	1.50	8,436	12,654
6	16	64	96	1.00	4,736	7,104	1.24	5,888	8,832	1.50	7,104	10,656
7.5	13	52	78	1.00	3,848	5,772	1.24	4,784	7,176	1.50	5,772	8,658
10	10	40	60	1.00	2,960	4,440	1.24	3,680	5,520	1.50	4,440	6,660
12	8	32	48	1.00	2,368	3,552	1.24	2,944	4,416	1.50	3,552	5,328
13	8	32	48	1.00	2,368	3,552	1.24	2,944	4,416	1.50	3,552	5,328
15	7	28	42	1.00	2,072	3,108	1.24	2,576	3,864	1.50	3,108	4,662
20	6	24	36	1.00	1,776	2,664	1.24	2,208	3,312	1.50	2,664	3,996
30	4	16	24	1.00	1,184	1,776	1.24	1,472	2,208	1.50	1,776	2,664
				74 Seated 0 Standing			74 Seated 18 Standing			74 Seated 37 Standing		

Typically, MDT passenger service is based on a six-minute headway during peak service and twenty-minute service on weekends and holidays as illustrated in Table 2-6.

Table 2-6 Typical Car Requirements Based on Varying Headway

Service Headway	*# Trains*	*Operating Cars*
Weekday Vehicle Requirements		
AM PVR - 6 Minutes	16	96
Base - 15 Minutes	8	48
PM PVR - 6 Minutes	16	96
Evening - 20 Minutes	6	36
Evening - 30 Minutes	5	30
Weekend & Holiday Vehicle Requirements		
Evening, 20 Minutes	6	36
Evening, 30 Minutes	5	30

Note: Operating Cars are based on six-car consists

Peak Vehicle Requirement (PVR)

The Peak Vehicle Requirement (PVR) is the total number of rail cars needed simultaneously in the peak periods to satisfy passenger demand while maintaining per-car passenger loads at or below a pre-determined level, based on MDT's established load factor of 1.00. The current service demand, including the Palmetto Station and rail extension, is sixteen (16) six-car trains totaling 96 cars. Failure management trains total 12 cars. The total PVR, including service demand and failure management, is 108 cars.

Failure Management Trains

Failure management trains (spares) are used to supplement passenger service when incidents or vehicle malfunctions occur that require replacement vehicles. The Central Control Rail Traffic Controller determines when a replacement is required and advises the Rail Yard Master at WLC Yard Tower. Replacement trains are dispatched to the mainline as required.

Minimum recovery time is available when removal of a train from service is required during peak periods of six-minute headways. Immediate failure management strategies are required to reduce passenger delay and eliminate crush loads. The following types of failure management strategies are implemented upon initiation of train replacement:

- Pocket tracks may be used for train removal, temporary storage and minor vehicle maintenance activity
- Headway may be adjusted to minimize service delays to passengers

- Station may be bypassed to minimize effect of headway adjustment, passenger flow, and schedule adherence
- Special event trains may be dispatched from the yard or temporarily stored in pocket track terminal stations and/or Tail Track
- Mainline pocket tracks and crossovers may be used for failure management strategies in terms of mitigating service interruptions due to train failures, system disruptions or passenger emergencies

Missed trips negatively affect customers, and six minute headways leave little recovery time when a train must be removed from service due to an equipment malfunction. A peak period service delay can inconvenience a significant number of customers whose trip might be lengthened if they are unable to board overcrowded trains. Trains that are at crush load reduce passenger flow, which in turn causes further train delay. Service interruptions, whether minor or major, tend to leave passengers frustrated.

When a train must be removed from mainline service for whatever reason, the service delay is the time required to physically remove the train from service minus the scheduled headway. The train may be placed in a turn-back track for removal to the main yard or shop at a later time; nonetheless, the removal of a disabled train from the mainline generally results in a delay greater than the headway interval.

Trains being removed from service may be operated light (no passenger boarding or station stops) to the nearest storage location or routed to the WLC Vehicle Maintenance Shop.

A sampling of the use of failure management trains from October 2000 through September 2001 is presented in Figure 2-6. The sampling includes Weekday Peak and Off-Peak periods, Weekday and Weekend Base service. The data consist of actual replacement trains utilized obtained from information recorded on Metrorail Yard Movement Logs. Monthly use of failure management trains ranged from a low of 53 trains in October 2000 to a high of 104 in August 2001 with a monthly average of 80 for the annual period presented. The trend line indicates MDT is experiencing a gradual increase in the use of failure management trains.

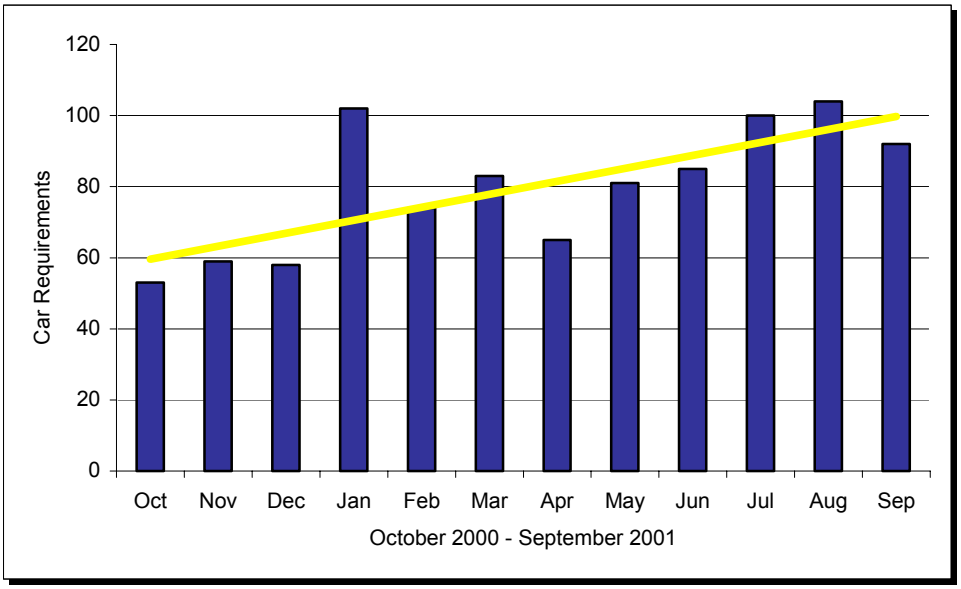


Figure 2-6 Car Requirements Including Failure Management Trains

Total car requirements including operating and failure management vehicles are detailed in Table 2-7.

Table 2-7 Weekday Total Operating and Failure Management Requirements

(Based on Varying Headway and
Including Service to the Palmetto Station Extension)

Service Headway	*# Trains*	*Revenue Cars*	*Failure Management Cars*	*PVR*
AM PVR, 6 Minutes	16	96	12	108
Base, 15 Minutes	8	48	12	60
PM PVR, 6 Minutes	16	96	12	108
Evening, 20 Minutes	6	36	12	48
Evening, 30 Minutes	5	30	12	42

Note: Based on six-car trains

Events and Influencing Factors Accounted for in Fleet Management Plan

The various expansions of the system as indicated in the Future System Development section of this plan are expected to be the main events and factors

that impact future PVR and car requirements. Continued promotion of and improvements to the transit system could increase ridership and create the need for an increased PVR and rail car fleet. Other external events, including escalating fuel prices, fuel shortages, and large migration into the Miami-Dade area could affect ridership and future headways.

Present System

Metrorail

Metrorail, which began service in 1984, is a 21.5-mile double track, single line, electrically powered, elevated rapid transit system extending from Kendall in the south to Hialeah in the north. There are 21 stations located on the existing system. Metrorail connects the following municipalities: Hialeah, Miami, Coral Gables, and South Miami.

Palmetto Station and Rail Extension

The Palmetto Station and rail extension is a new 1.4-mile expansion of Metrorail from the previous northern terminus, Okeechobee Station, using existing railroad right-of-way, to the west side of the Palmetto Expressway. The Palmetto Station extension, presently under construction, is scheduled to begin revenue service in February 2003. It includes a passenger station and a surface parking facility that provides over 700 spaces. Service for the Palmetto Station extension will increase the Peak Vehicle Requirement by one six-car train.

Future System Development

The 2001 Transit Development Program update provides the 5-year recommended service plan for the 2002-2006 period.

In late 2000, Metrorail implemented a significant service improvement to address overcrowding during peak periods on workdays. Metrorail reconfigured peak period trains from 4-car trains to 6-car trains. The resulting PVR increased from 68 to 82 rail cars and will rise to 108 cars with the opening of the Palmetto Station and rail extension.

Recommended service improvements during 2002-2006 include the following:

- Improve midday workday service frequency from 15 to 10 minutes
- Improve weekend service frequency from 20 to 15 minutes
- Extend Metrorail service to the new (under construction) Palmetto Station; estimated PVR increase of 6-12 cars
- Introduce “night owl” rail services with a 30-minute frequency to selected stations from midnight to 6:00 A.M.

North Corridor

The North Corridor is a 9.5-mile heavy rail alternative, running from the Dr. Martin Luther King, Jr. Metrorail Station, along NW 27th Avenue to NW 215th Street (Miami-Dade/Broward County line) with proposed stations at Northside Shopping Center, MDCC-North Campus, City of Opa-locka, Palmetto Expressway, Carol City Shopping Center, Pro-Player Stadium and the Florida Turnpike.

The final Environmental Impact Statement (FEIS) was completed in spring 1999. The project is identified in the cost feasible section of the 2015 and 2020 LRTP, and the financing plan assumed 70% federal funding and 30% local and state sources.

The Proposed Operating Plan includes:

- Peak period – 8 minute service North Corridor leg and 8 minute service along existing Hialeah branch west of NW 27th Ave
- Peak headways of 4 minutes from MLK station south
- PVR equals 10 additional trains or 40 cars – assuming all trains would have 4 cars and Palmetto Station and rail extension would be completed

Prior to enactment of the People's Transportation Plan (PTP), this project was under study for possible conversion to a BRT line. Under the PTP, Years 2003-2031, the North Corridor is included in rapid transit improvements and will receive top priority to go into Final Design and Construction phase at a projected cost of $555 million.

East-West Corridor

The East-West Corridor consists of two segments, one from the Florida Turnpike east to the Palmetto Expressway (SR 826) and from the Palmetto through Miami International Airport, downtown Miami, and to the Port of Miami, 6-miles and 11.2-miles, respectively. Potential station locations include: Florida Turnpike, NW 107th Avenue, NW 97th Avenue, NW 87th Avenue, Milam Dairy Road, Blue Lagoon Area, Miami Intermodal Center, NW 27th Avenue, Orange Bowl, Government Center (downtown Miami), and the Port of Miami.

The East-West Corridor is a 2015 LRTP cost feasible element with federal funding of 40% of the total capital cost of $800 million. The FEIS has been completed, and Record of Decision was received in September 1998.

The MOS has a significant impact on the current system in terms of vehicle needs. The FEIS called for an additional maintenance facility for vehicles associated with this service. PVR is projected at 40 vehicles with an additional 8 vehicles for a 20% spare ratio.

The Operating Plan specifies 3-minute service combining east-west and non-stop airport-seaport. Future phases include:

- Extension to Florida International University (6 miles)
- New light rail line serving South Miami Beach area intersecting the East-West line at the Maritime Park station

The project was delayed pending resolution of funding issues. A transportation corridor study was conducted on the Downtown Miami-Miami Beach easternmost segment of this corridor, and various transit technologies were evaluated, e.g., Bus Rapid Transit (BRT), light rail, etc.

The East-West Corridor is included in the People Transportation Plan (PTP), Years 2003-2031, at an estimated cost of $2,789 million.

The People's Transportation Plan includes 62.2-miles of additional rapid transit lines. Federal, state, and local planning processes need to be completed on these projects to determine feasibility, technology, and corridor alignment. The corridors include, but are not limited to, the following:

Earlington Heights/Airport Connector

The Earlington Heights/Airport Connector is a 3.1-mile extension from the Earlington Heights Metrorail Station to the Miami Intermodal Center, located on the east side of Miami International Airport. The estimated cost of the corridor is $207 million.

In September 1999, the MPO Governing Board asked the County Manager to implement a rail link to the proposed MIC serving Miami International Airport. An environmental impact statement is currently being prepared to establish this link. As the project becomes a reality, the rail PVR will be affected; although, it is still too early to determine the extent of the impact.

Kendall Corridor

Kendall Corridor is a 15-mile corridor with both east-west and north-south segments.

The Major Investment Study (MIS) was completed in July 2000. The MIS evaluated potential improvements for the next 10 years. The estimated cost of the Kendall Corridor is $877 million.

Northeast Corridor

The Northeast Corridor is a 13.6-mile corridor extending from downtown Miami, through Little Haiti, to NE 215th Street, generally along the Biscayne Boulevard/US 1 Corridor and Florida East Cost Railroad right-of-way. The estimated cost of the Northeast Corridor is $795 million.

Due to the length of this corridor, any rail alternative would significantly affect rail PVR needs.

Baylink

Baylink is a 5.1-mile corridor between downtown Miami and South Miami Beach projected to cost $510 million.

Rail Extension to Florida City

The Rail Extension to Florida City is a 21-mile rail extension along US 1 consisting of two segments, one from Dadeland South Metrorail Station to Cutler Ridge, and one from Cutler Ridge to Florida City at a projected cost of $964 million.

Douglas Road Extension

Douglas Road Extension is a 4.5-mile corridor from the Douglas Road Metrorail Station to the Miami Intermodal Center and is projected to cost $280 million.

Summary

- The above-identified projects are considered to have a potential impact on rail vehicle procurement in the next 10 years.
- Other projects identified in MDT's Program of Inter-related Projects (PIP) and Miami-Dade's LRTP will have to be evaluated as required.
- The East/West Corridor figure only represents the MOS from Palmetto Expressway to Port of Miami. The PVR includes special non-stop Airport-Seaport service.
- Kendall-Airport Corridor assumes that the East/West Corridor is in place and would interface with it at the western terminus station of the East/West line (Palmetto Exp); hence, the limits assumed are from SW 157th Avenue/Kendall Drive to NW 7th Street/Milam Dairy Avenue even though the study will examine continuing eastward to the proposed MIC site.

An analysis of projected demand for revenue vehicles assuming that six-car trains are operating is provided in Table 2-8.

Table 2-8 Projected Demand for Revenue Vehicles

Lines	*PVR Cars*	*Peak Headway (Minutes)*	*Other Options Under Study*
North Corridor	40	8 and 4	BRT
East-West Multimodal Corridor	48	3	BRT, Light Rail
Northeast Corridor	TBD	TBD	BRT, Light Rail
Kendall Corridor	0	N/A	Converted to BRT
Earlington Heights to MIC Rail	TBD	TBD	

Scheduling and Operating Strategies Used to Reduce In-Service Car Requirement

Recovery Technicians

Timely restoration of service with minimal disruption is one of MDT's primary goals. The assignment of recovery technicians during critical service periods enhances service restoration. One Rail Vehicle Electronic Technician is assigned to the mainline, Monday through Friday between the hours of 6:00 a.m. and 10:00 p.m. The Mainline Recovery Technician assists operations in keeping service interruptions to a minimum and responds to vehicle failures as well as to service interruptions when directed by Central Control. The Recovery Technician also relays vital information concerning vehicle failures and equipment diagnostics for troubleshooting to the maintenance supervisors at WLC. The Recovery Technician is stationed at Government Center Station located in the center of the Metrorail system. While Recovery Technicians are not assigned to the mainline after 10:00 p.m. on weekdays or on weekends, Train Control and Traction Power Technicians are on call and prepared to respond as needed. During special events held after 10:00 p.m. or on weekends, additional revenue cars are provided and a Recovery Technician is assigned to the mainline. All Rail Vehicle Technicians assigned to Recovery receive training on vehicle systems and "Moving Bad Order Trains."

Rail Transportation

Rail Transportation provides Central Control, Yard Control and Rail Supervision.

Rail Traffic Controllers are responsible for Central Control activity. They coordinate, monitor, and direct Mainline operations and are responsible for all revenue and non-revenue train movements made on the mainline, including the Tail Track to the Yard Limits.

Rail Yard Masters are responsible for WLC Yard Tower activity. They direct, monitor, and coordinate all trains and rail work equipment movement within Lehman Center Yard limits. They are responsible for Train Operator staffing,

direct the make-up of trains, and coordinate with Rail vehicle Maintenance to maintain vehicle requirements.

Rail Supervisors are responsible for supervision of Train Operators, and provide assistance to Rail Central Control. They monitor Train Operator performance both in direct operator interaction and failure management activities.

Train Operators are responsible for operating Metrorail trains.

SECTION II-B: ESTIMATION OF FLEET DEMAND RESULTING FROM CAR MAINTENANCE REQUIREMENTS

Two types of maintenance are performed on the rail car fleet:

Operating Maintenance: Scheduled (preventive) maintenance to include replacement of specific components and/or systems to improve the reliability of the rail car and Unscheduled (corrective) maintenance

Car Renovation: Involves complete overhaul of the vehicle and replacement of obsolete components to extend the life of the vehicle; performed when vehicles reach one million miles.

Maintenance Assigned Vehicles

Maintenance assigned vehicles are those vehicles out of service for "scheduled" preventive maintenance and "unscheduled" corrective maintenance.

The number of married pairs in this category is determined by historic experience as reflected in records and in the Preventive Maintenance (PM) Program specifications. The daily average of maintenance assigned vehicles is 28.

Vehicle availability from October 2000 to September 2001 is reflected in Table 2-9. Active vehicles are those vehicles not currently stored; available vehicles are those vehicles ready for revenue service; and, unavailable vehicles are those vehicles assigned to vehicle maintenance for scheduled and unscheduled maintenance.

Table 2-9 Active and Available Rail Married Pairs

October 2000 – September 2001

	2000			*2001*								
Status	***Oct***	***Nov***	***Dec***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***
Pairs	68	68	68	68	68	68	68	68	68	68	68	68
Active	67	65	66	66	65	65	65	65	65	66	65	65
Available	38	40	42	46	43	45	43	49	43	43	44	45
Unavailable	30	28	26	22	25	23	25	19	25	25	24	23

The relationship between "active" and "available" married pairs is illustrated in Figure 2-7.

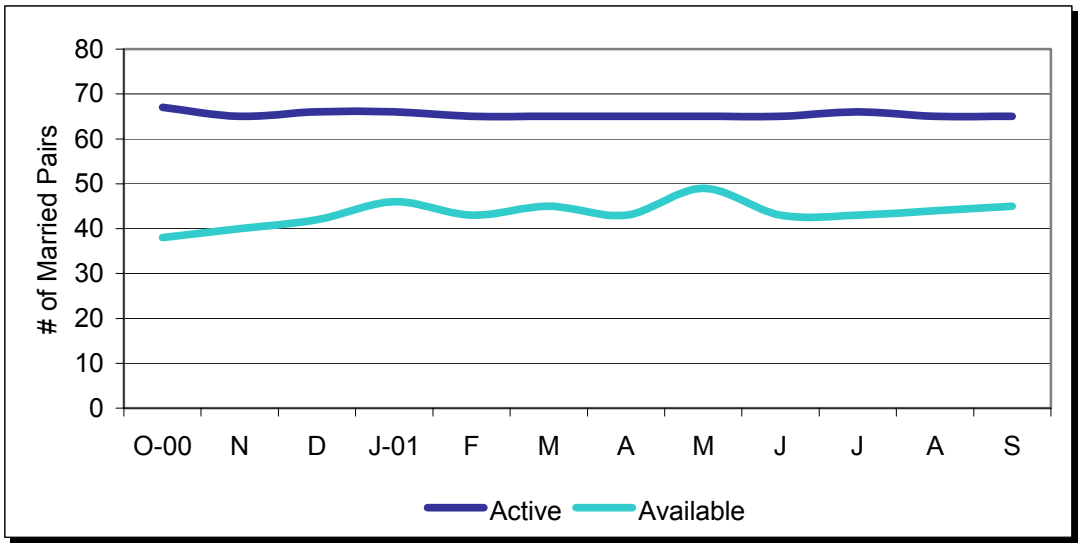


Figure 2-7 Metrorail "Married Pair" Availability

October 2000 – September 2001

Scheduled Preventive Maintenance (PM)

The Metrorail transit car scheduled maintenance program is designed to maintain car reliability by detecting potential defects to facilitate correction prior to failure.

With assistance from Rail Maintenance Control, Rail Vehicle Maintenance incorporates "trend analysis" into the PM Program. Actual failures are tracked to establish failure rates for specific equipment types. Trends within those failure rates are established, and PM replacement schedules are adjusted for component replacement accordingly. Timely replacement of components based on actual failure rates minimizes in-service failures and improves the overall quality of Metrorail service.

The scheduled maintenance program also accomplishes servicing of equipment that requires lubrication, measurement, and adjustment. Rail cars are withdrawn from service at regular calendar and/or mileage-based intervals, whichever occurs first, to permit scheduled preventive maintenance activities. Rail Maintenance Control prepares the PM schedule using an on-time adherence window of five days before through five days after the target inspection date. To achieve on-time adherence, Vehicle Maintenance Technicians are required to perform the PM on the day scheduled by Rail Maintenance Control as indicated on the PM calendar. The following is a summary of the types of inspection activities that make up the scheduled maintenance program.

Daily Inspection

- Safety test of the car borne automatic train control equipment
- Visual inspection of car interior and exterior
- Functional test of safety-critical and passenger convenience components
- Defects are corrected prior to releasing car for service

Schedule for Types of Inspections

- Electrical and mechanical inspections are classified as Type A, B, C, D, F, G, and S
- Frequency of inspections listed in Table 2-8
- Brief descriptions of the activities are included in Appendix A and Appendix B

Vehicle Maintenance staff not only routinely complete 100% of the A-D inspections that are scheduled but also complete 100% of those inspections on time.

Rail Car Preventive Maintenance Schedule

In July 2001, the existing A, B, C, and D preventive maintenance schedule, corresponding to 45, 90, 180, and 360-day intervals was revised to 60, 120, 180, and 360-day intervals. The A-interval is performed every 60 days rather than every 45 days, and the B-interval is performed every 120 days rather than every 90 days. The C and D-intervals remain unchanged.

An analysis of fleet labor hours required per year shows a savings of an estimated 4,590 labor hours based on the revised PM schedule. A-inspections required will drop from eight to six annually, and B-inspections will be reduced from four per year to three. The elimination of those three inspections translates into a savings of 204 maintenance inspections annually with a savings of approximately 7.5 mechanical hours and 15 electrical hours for each PM.

Nearly 45% of the PM tasks are A-type tasks and 5% are B-type tasks involving routine inspection, cleaning, and minor adjustments. Since these tasks are performed frequently, negligible systems impact is expected by increasing the A-interval by 15 days and the B-interval by 30 days. The mechanical and electrical items inspected include contact condition, fluid levels, grease lubrication, motor brush wear, and carbody components that do not change rapidly. Most of these items remain in acceptable condition well beyond the inspection intervals, and it is unnecessary to change component wear-out criteria for replacement as specified in the PM. Feedback from maintenance personnel is used to review the revised schedule and adjustments will be made, if necessary.

PM labor hour savings can be allocated to other maintenance activities, such as rebuilding low-rated G-inspection items. Other potential benefits of the revised PM schedule include the following:

- Possible reduction in overtime expenditures
- One additional married pair for service on most days
- Reduction in yard moves to and from shops for PM purposes and other sequential moves of approximately 20%
- Reduction in facilities maintenance due to decreased lift usage for PMs
- Improvement in Mean Miles Between Service Failures (MMBSF) based on increased component repair activity
- Reduction in disposable parts expenditures, i.e., projected $10,000 annual savings in disposable air filters

The current PM scheduled is outlined in Table 2-10.

Table 2-10 Rail Car Preventive Maintenance Schedule

Inspection Type	***Inspection Interval***	***Interval Mileage***	***Labor Time (Hours) Per Pair***
Daily	24 hours		0.3
A	60 days	16,000	15.9
B	120 days	32,000	16.2
C	180 days	48,000	28.5
D	360 days	96,000	31.7
F	4-5 years	200,000	210.0
G	8-10 years	400,000	420.0
S	Removed from storage and returned to service		

Type A

- Base level PM scheduled at a 60-day interval
- Aimed at preventing most common problems

Type B

- Scheduled at a 120-day interval
- Includes all the requirements of the Type A Inspection
- Includes additional tasks aimed at more in-depth checks of the components

Type C

- Scheduled at a 180-day interval
- Encompasses all the requirements of the previous inspections
- Adds more detailed checks of the traction motor, coupler, friction brakes, gear unit, and electrical systems

Type D

- Scheduled at a 360-day interval
- Includes all of the tasks of the previous levels

Type F

- Scheduled at a 4-5 year interval
- Includes all of the tasks of the previous levels
- Includes long range component overhaul

Type G

- Scheduled at an 8-10 year interval
- Includes “F” Inspection as well as other long range component overhaul requirements

Type S

- Performed when rail cars are removed from storage and returned to active service
- Functional check of all components and systems to ensure the vehicle is ready for revenue service; description is included in Appendix C

Scheduled Component Overhaul

F-Inspection

- Represents the 4-5 year component overhaul corresponding to approximately 200,000 miles

G-Inspection

- Represents an 8-10 year overhaul interval, corresponding to approximately 400,000 miles

To date, 58 rail cars have undergone an F-inspection while 24 rail cars have received a G-Inspection. All vehicles in the fleet have exceeded the mileage and interval for the G-inspection. A list of components replaced in the F & G inspections is presented in Appendix D. The overhaul includes the braking

system, Heating, Ventilation and Air Conditioning (HVAC) equipment, couplers, draft gear, gearboxes, and wheels. Equipment overhaul is performed by personnel at WLC with assistance from outside vendors. Cumulative mileage of vehicles is included in Appendix E.

Vehicle Maintenance staff are in the process of reviewing the planned "G" Inspection schedule to assess whether manpower needs for work scope and implementation are realistic and to determine how this work can be accelerated. The action plan includes reconvening the "G" Inspection Committee to examine "G" Inspection tasks, establish the most crucial work, and identify work that can be outsourced. In September 2001, the "G" Inspection Program was temporarily stopped. All available labor was re-assigned to meet the PVR of 90 cars, and all rebuild work was contracted-out. Additional Electronic Technicians have been hired and are currently in training. Upon completion of the ET training program, labor will be re-assigned to the "G" Inspection based on the recommendations of the "G" Inspection Committee.

Cleaning Program

A Car Cleaner is assigned to Dadeland South Station between the hours of 8:00 a.m. and 4:00 p.m., Monday through Friday. The Car Cleaner provides daily trash and newspaper removal while trains are in revenue service.

All exterior and interior cleaning is performed at WLC. Daily interior cleaning is performed on storage tracks (ST 28 and ST 29), which are equipped with a center platform to give Car Cleaners easy access to the rail cars. Level Two and Level Three cleaning are performed on a maintenance track (MT 8) in the maintenance facility.

The cleaning program consists of three levels of interior and exterior cleaning accomplished during off-peak and non-revenue hours.

<u>Level One</u>

- Performed daily on all rail cars scheduled to operate in revenue service
- Includes: sweeping and mopping floors, cleaning interior windows, panels, seat backs, removing gum from floors, and replacing seat covers as required
- Cars with graffiti or vandalism are removed from service immediately
- Exterior washing through the automatic car wash is scheduled for three times per week by train operators taking their trains through the automatic car wash as they are laid up in the yard after morning peak service

Level Two

- Performed four times per year
- Includes detail cleaning (hand washing) of the interior ceilings, light fixtures, seat backs, and polishing interior stainless steel with steel bright

Level Three

- Exterior cleaning performed bi-annually
- Includes pressure washing and hand cleaning the vehicle exterior and undercarriage with an acidic detergent to remove iron oxides and stains from the vehicle

Preventive Maintenance Program Monitoring and Support

Responsibility for development of and revisions to the scheduled maintenance program lies with Field Engineering and Systems Maintenance Division, Rail Vehicle Maintenance, and Rail Maintenance Control (RMC).

Maintenance Management Information System

Throughout MDT, a variety of both manual and automated systems are used for managing inventory, purchasing, creating and tracking work orders, labor allocation and other maintenance and materials management functions. Most systems are not interfaced or do not communicate with one another, which causes data to be duplicated and results in the production of inconsistent reporting throughout MDT. The two largest systems, Transit Rail Inventory (TRI) and Transit Equipment Administration (TEA) are 20-year old mainframe applications that are costly to maintain and difficult for personnel to use.

On October 3, 2000, the Materials Management & Maintenance (M3) Project was officially started to address these problems. A committee comprised of members of all functional areas was created. Committee members were responsible for submitting user requirements and attending vendor demonstrations. Information Technology Services completed the “Feasibility Study” on August 9, 2001. The M3 Project is presently in the procurement phase. MDT plans to replace the TEA in 2003.

Since 1986, serialized components have been tracked to facilitate scheduled overhauls/repairs and reliability analysis. All materials have been tracked and reported.

Reliability Improvement Program

Several programs are in place to improve the reliability of equipment through upgrade of existing components and/or replacement of units. These include:

- A/C Drive HVAC Evap Motors
- Traction Motors
- Gear unit rebuilding

The philosophy and goals of the Metrorail/Metromover Maintenance Program Policy are to maximize cost effectiveness of maintenance efforts consistent with safe operations through a proper balance of preventive maintenance, corrective maintenance, and systems improvements, where necessary. Appendix F provides an outline of the MDT Metrorail/Metromover Maintenance Program Policy. The mission of the maintenance program is accomplished through the following objectives:

- Eliminate increases in component failure rates due to equipment age
- Increase reliability of components and subsystems through identification and modification of existing design
- Improve efficiency of maintenance operations through:
  - Productivity-enhancing capital investments
  - Re-design of shop processes
  - Enhancement of the skills of the workforce, and
  - Application of state-of-the-art repair techniques and test equipment

<u>Safety</u>

- Of primary concern, and above all other concerns is ensuring that the entire system, including passenger vehicles, operates safely at all times

<u>Reliability</u>

- System reputation and ridership depend on overall performance
- Excessive disruptions in service are unacceptable and must be kept to a minimum
- To maintain a high standard of reliability, all required maintenance must be performed at proper interval
- To assist in lowering component failures, the maintenance engineering process of identification of problems and equipment modification in the event of ongoing equipment malfunctions through MDT's Change Review Board must be supported

Quality

- Safe and reliable performance can only be achieved if quality work is performed
- Quality increases reliability and safety
- Safety, reliability, and quality are inseparable, dependent concepts essential to the provision of first class transit service

Cleaning

- Clean vehicles are relevant to customer comfort and service desirability and are the difference between transporting people and serving customers. Clean, comfortable vehicles are essential to providing quality service to MDT customers.

Rail Vehicle Maintenance continues to strive to meet all preventive maintenance schedules at 100% on-time completion rate and corrective maintenance requirements achievable with allocated resources.

Unscheduled Corrective Maintenance

When maintenance is accomplished as a result of in-service failures, it is difficult to compensate for the absence of the equipment. Service quality suffers and is more expensive. The approved Metrorail/Metromover Maintenance Program Policy for Rail Vehicle Maintenance, Appendix F, strives to minimize unscheduled corrective maintenance to avoid the accompanying service quality degradation.

Maintenance planning for long-term overhaul requirements began in 1987, only three years after the fleet started revenue operation, and has continued throughout the years in advance of the Original Equipment Manufacturer (OEM) recommended intervals. Unfortunately, lack of adequate funding hindered maintenance in reaching component and subsystem rebuilding goals. Additional staff was allocated to operate a variety of component shops and perform G Inspections; however, the expanded PVR and vacancies in critical positions redirected MDT personnel efforts from component overhaul to running repair. Component overhaul is currently accomplished on contract by certified vendors.

Maintenance staff developed a work plan to improve the MMBSF. The action plan includes additional allocation of manpower for vehicle repair and maintenance from a variety of sources to reduce in-service failures. Changes in the rail car PM schedule, as discussed previously, will provide additional labor hours for repair of “G” Inspection components rated “bad “ or “poor.” Six Electronic Technician (ET) positions eliminated when vehicles were mothballed

in 1995 have been restored, and the ETs have begun work. A major effort to fill vacant ET, Mechanic, and Machinist positions was undertaken in early 2002.

Other actions include correcting mean miles/time methodology, defining “failure,” establishing an efficient and accurate methodology to measure on-time performance, and recalculation of service disruptions. Figure 2-8 illustrates the mean miles between service failures during FY 2001, which are defined as the ratio of married pair vehicle miles operated to the number of vehicle mainline hardware failures that resulted in a service interruption. Given that this method of calculating mean miles between service failures includes all failures regardless of the length of the disruption caused by those failures, little can be concluded concerning Metrorail’s performance from a passenger impact perspective. On October 2001, Metrorail redefined “failure” for performance reporting. The methodology for measuring MMBSF performance for Metrorail in the future will be based on service disruptions equal to or greater than 3 minutes. Establishing a range of time for service interruptions provides a better indication of disruptions that actually impact passengers and brings Metrorail more in line with the reporting methodologies common within other transit agencies.

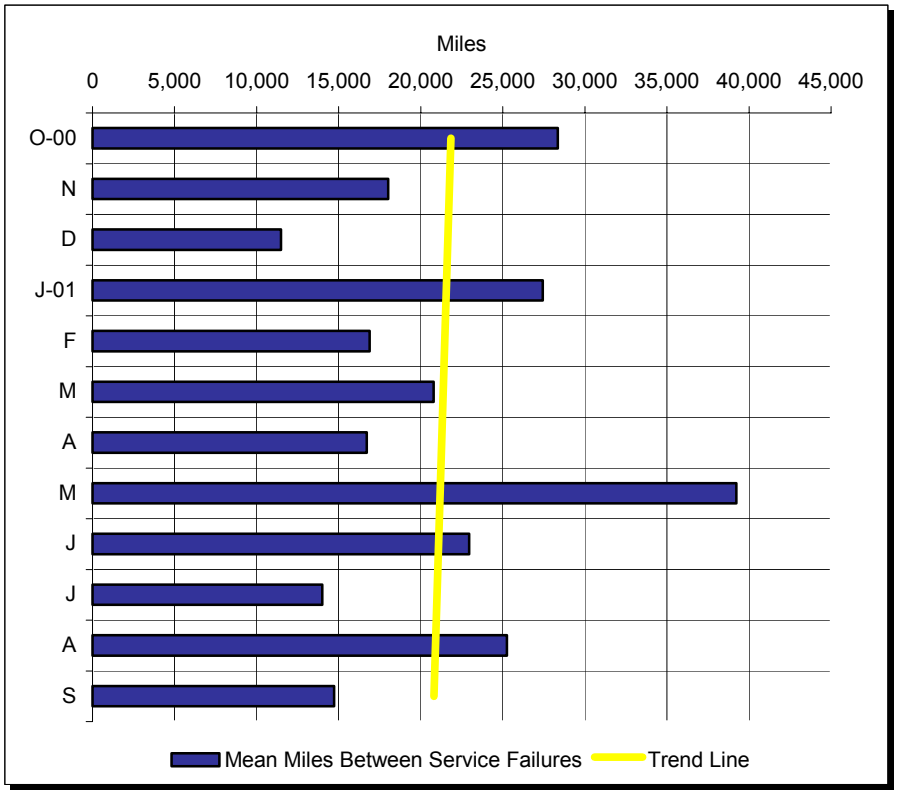


Figure 2-8 Mean Miles Between Service Failures

October 2000 – September 2001

Train Malfunctions

Safety-Related Failures

A number of safety-related conditions require that a train be removed from service. Subsystems where these failures are likely to occur include:

- Automatic Train Control (ATC)
  - Automatic Train Protection (ATP)
- Propulsion
- Brakes
- Headlights and taillights
- Passenger door problems
- Cracked or shattered passenger windows
- Communications

When a train exhibits a safety concern in one or more of these subsystems, the train is examined for corrective action. If the problem cannot be remedied, passengers are removed from the train, and the train is removed from service. Safety of passengers and employees is critical in Metrorail operations.

NOTE: Any condition that exhibits a safety hazard to passengers or employees requires corrective action and may be removed from service. Any train that exhibits a carbourne system failure impacting the safety of passengers or employees is removed from service. This action is consistent with MDT's operating philosophy as well as MDT's System Safety Operating Plan. FY 2001 system failures and repairs are provided in Table 2-11.

Table 2-11 Metrorail Fleet Repairs

System	*FY2001*	*% of Total*
Car Body	761	12.5%
Mechanical Coupler	100	1.6%
Door	264	4.3%
HVAC*	811	13.3%
Miscellaneous Electrical	314	5.2%
Power & Traction*	1,488	24.4%
Truck & Suspension	711	11.7%
Friction Brakes*	936	15.4%
Communications	201	3.3%
Train Control	434	7.1%
Lighting	68	1.1%
Total	6,088	

*These subsystems contain most of the electrical, mechanical, and pneumatic components.

Power and traction represents nearly 25% of all fleet repairs followed by Friction Brakes at 15% and HVAC at 13%. When combined, these three areas, which contain most of the electrical, mechanical, and pneumatic components, account for over half of all repairs. Fleet repairs identified by each system's percentage of the total are illustrated in Figure 2-9.

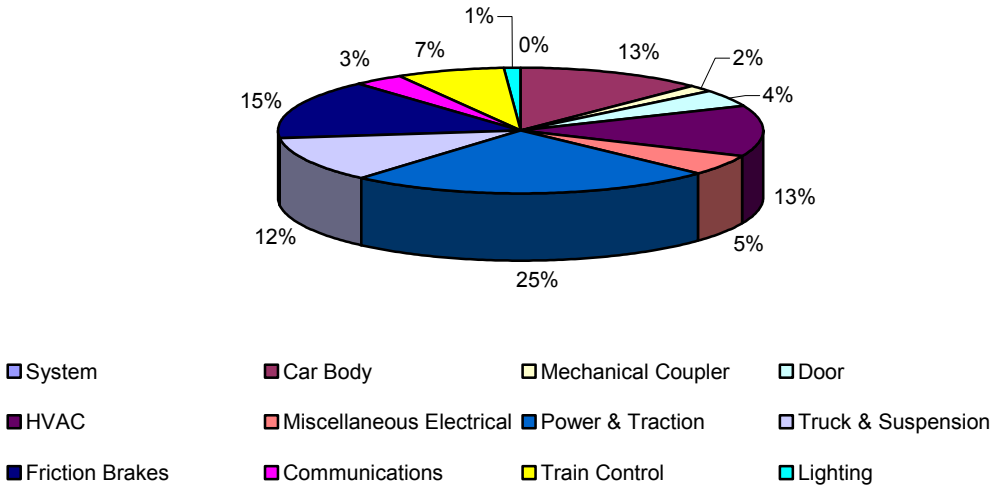


Figure 2-9 Metrorail System Repairs

% Total Repairs

In an effort to avoid recurring maintenance problems that impact operations, leadworkers were assigned to all shifts to troubleshoot complex repeat failures and other conditions difficult to diagnose. Integration of the SWAN Diagnostic System to provide precise evaluation and identification of major bearing and gear wear failure is underway. Transit Engineering finalized the Request for Proposal (RFP) for consulting services to develop bid documents for Metrorail vehicle modernization. The RFP was transmitted to the Office of Procurement Management in late 2001 and was advertised for bids in early 2002. Overhaul of vehicle subsystem components rated “bad” or “poor” has begun in conjunction with certified vendors and the OEMs.

Removal of Trains from Passenger Service

In addition to equipment-related malfunctions, which result in removal of trains from service, trains must be removed from passenger service under a number of safety-related failure conditions. Rail Transportation assures strict adherence to the Metrorail Rules and Procedures Manual. The safety-related rules delineated in Table 2-12 can prevent a train from being dispatched or require that a train be removed from service.

Table 2-12 Metrorail Operation and Manual Operating Rules

Rule #	*Requirements*
4041	Train Operators shall immediately report discovery of flat spots on train wheels to the Rail Traffic Controller/Rail Yard Master and submit a written report, if required to do so.
4054	If headlights or taillights fail, only during daylight service hours, affected car shall be taken out of service at the end of the line or as soon as possible. Note: A temporary light (battery operated lantern) must be placed in the cab windshield.
4055	A train shall not be dispatched for service with inoperable headlights or taillights.
4070	Safety Seals on control toggle switches shall not be broken without permission from the Rail Traffic Controller or Rail Yard Master.
4089	No train shall be dispatched from the yard or storage tracks with less than 100 percent braking.
4090	Trains with less than 75 percent friction braking shall be removed from service immediately.
4092	Trains with 50 percent propulsion shall be removed from service as soon as possible.
4093	Trains with less than 50 percent propulsion shall be removed from service immediately.
4136	The Rail Traffic Controller must be notified immediately if the ATP fails. Only the Rail Traffic Controller may authorize ATP to be by-passed and a train to proceed by fixed signals or signs at Restricted Speed or as otherwise directed.

Other Types of Failures

In addition to safety related conditions, MDT removes trains from service that could have an adverse effect on passengers. Examples include:

- Due to the climate of Miami, trains experiencing air-conditioning problems are removed from service at the earliest convenience.
- Metrorail trains have six (6) sets of passenger door panels per car. More than one single panel cut-out on the same side of the car renders the car unserviceable for passenger use.
- A train, which experiences major vandalism involving graffiti, is removed from service.
- When the passenger on-board intercom system between individual cars and the operator's cab fails (i.e., passengers cannot communicate with Train Operators and vice versa) the train is removed from service.

Environmental Conditions Affecting the Spare Factor

A variety of environmental impacts criteria were analyzed, and it was determined they have no significant impact in the Operating Spare Ratio (OSR). The OSR, therefore, is not adjusted to account for exceptional environmental hazards.

The main issues regarding environmental conditions that do affect the OSR in Miami include the following:

1. Metrorail rail system line is mostly elevated (grade-separated) with only three segments at grade;
2. Metrorail rail cars are stored in an open air yard;
3. Metrorail system traverses parts of Miami-Dade County that are, for the most part, within the 100 – and/or 500-year flood plain; and
4. Possible environmental hazards that include:
    a. On a regular, seasonal basis: wind-driven rain, sun exposure (ultraviolet rays) impact on car appearance, and direct lightning strikes on cars and equipment
    b. On an irregular, seasonal basis: area is subject to direct and/or indirect effects of tropical storms, including category 1-5 hurricanes (during the wet season from June 1 until November 30), and very infrequently, tornadoes can occur

Based on recent history, it appears the only significant danger is if the area where a major portion of the car-fleet is located sustains a direct hit by a tornado or a major hurricane. The last and only (major) hurricane experienced in the area since the opening of Metrorail was Hurricane Andrew, in August 1992. This was a Category 4 storm whose center passed through an area some 15 miles south of the southern terminus of the rail system (southernmost station), and some 30 miles from the Metrorail William Lehman Center, where the yard and shop facility is located. No damage, except blown segments of the third rail and board cover, was experienced at the time. Should a similar storm pass closer to (or over) the yard and shop area, some damage may be expected to the car fleet.

Since these are unpredictable natural occurrences, a “hurricane preparedness” plan has been developed to help mitigate the possible damage done by a storm’s direct hit. This preparedness plan is revised and re-issued annually prior to the hurricane season.

Covered and protected areas of the maintenance buildings at the William Lehman Maintenance Center can accommodate up to 15 married pairs (30 cars).

Rail Cars Out of Service: The Operating Spare Ratio

FTA defines the Operating Spare Ratio (OSR) as follows:

$$\text{Operating Spare Ratio} = \frac{\text{Total Fleet} - \text{Peak Vehicles Required}}{\text{Peak Vehicles Required}}$$

MDT chooses to use the Operating Spare Ratio (OSR) as an indicator of proper available fleet utilization. For FY 2002, the MDT operating spare ratio, as defined by FTA, equals 25.9%, as indicated by the following calculation:

FY 2002:
Total Fleet = 136
PVR = 108
Operating Spare Ratio = (136-108) / 108 = 25.9%

MDT's OSR has shown significant decline since FY 1996. While the total active fleet has remained constant at 136, the PVR has risen from 86 to 108. This 26% increase in the PVR reduced the MDT OSR from 58% to 26%.

Revenue vehicle supply and demand for FY 1999 through FY 2009 are reflected in Table 2-13 and are based on a PVR of 108, maintenance requirements of 22, and allocation of 6 vehicles for modernization during FY 2003 through FY 2009.

Table 2-13 Revenue Vehicle Demand and Supply

FY 1999 – FY 2009

Vehicle Demand and Supply of Revenue Vehicles											
	FY 99	*FY 00*	*FY 01*	*FY 02*	*FY 03*	*FY 04*	*FY 05*	*FY 06*	*FY 07*	*FY 08*	*FY09*
VEHICLE DEMAND											
Operating Requirements											
Scheduled on Line	68	68	90	96	96						
Failure Management Trains	10	10	12	12	12						
Transition Cars	4	4									
Peak Vehicle Requirements	82	82	102	108	108	108	108	108	108	108	108
Maintenance Requirements											
Scheduled Maintenance	6	6	4	6							
Unscheduled Maintenance	20	20	22	22							
Maintenance Total	26	26	26	28	22	22	22	22	22	22	22
VEHICLE SUPPLY											
Vehicles Owned											
Vehicles Owned/Purchased	136	136	136	136	136	136	136	136	136	136	136
Total Stored/Rotation Vehicles	24	24	6	6	0	0	0	0	0	0	0
Planned Procurement	0	0	0	0	0	0	0	0	0	0	0
Adjustment to Vehicle Supply											
Accident Damaged Vehicles	0	0	0	0	0	0	0	0	0	0	0
Car Modernization	0	0	0	0	6	6	6	6	6	6	6
Total Fleet	136	136	136	136	130	130	130	130	130	130	130
FTA Operating Spare Ratio	65.9%	65.9%	33.3%	25.9%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%

Note: FY 2003 – FY 2009 figures are projections based on preliminary planning to date.

Special Events

MDT provides extra service to support increased ridership to special events (i.e., sporting events, concerts, etc.). Extra service is scheduled in advance or determined by the ridership to the event. Special events usually require a minimum of two (2) trains, one (1) for northbound and one (1) for southbound service.

The Effect of Maintenance Policy on the Spares Ratio

Summary of Maintenance Requirements

Spare Vehicles

Spare vehicles are revenue vehicles that are required by MDT in order to maintain planned schedules and at the same time accommodate the following activities:

- Routine requirements
- Heavy maintenance requirements
- Unexpected vehicle breakdowns
- Accidents
- Other

Passenger Service Vehicles

Passenger service vehicles are those vehicles scheduled on the mainline during peak periods to provide revenue service, in addition to the failure management vehicles required to insure the provision of a minimum number of revenue vehicles. The Peak Vehicle Requirement varies and is based on the level of service being provided at a given time according to the following:

- MDT's Service Planning Guidelines
- Ridership
- Demand patterns

Past Experience

Over the past two years, MDT has determined that an adequate spare ratio is necessary to ensure PVR is met daily. If not for the fact that MDT had an adequate fleet spare ratio, service quality would have deteriorated.

Current Spares Requirements

To maintain the current level of performance in the maintenance shop, approximately 28 cars are held out of service for scheduled and unscheduled repairs. Based on maintenance data, calculation of the maintenance demand is as follows:

Table 2-14 - Calculation of Maintenance Vehicle Demand

Need	*Pairs per Day*	*Cars per Day*
Preventive Maintenance (PM)	3	6
Repair	8	16
Wheel Changes	3	6
Total	14	28

Married Pair Cars

MDT's entire fleet consists of married pairs. This fact has a significant impact on the spare ratio given its major effect on car availability. If one car fails, the other car married to it must also be removed from service. A failure to one car in service requires two cars to maintain the same service level.

Rail Car Maintenance Facilities

There is currently one Metrorail car maintenance repair facility in operation. A new shop is planned in conjunction with the opening of the East-West Line at a date to be determined in the future. Those facilities are identified in Table 2-15.

Table 2-15 Rail Car Maintenance Facilities

Shop	*Line*	*Year Opened*	*Function*
Lehman	Main	1984	Heavy Repair Overhaul Inspection and Heavy Repair
TBD	East-West	TBD	Heavy Repair Overhaul Inspection and Heavy Repair

SECTION III: THE SUPPLY OF REVENUE VEHICLES

This section of the Metrorail Fleet Management Plan addresses the supply of Metrorail revenue vehicles, explains the balance between the demand for vehicles and the supply of vehicles, and summarizes the maintenance plan.

Planned Rail Car Procurements

There are no plans in place at this time to procure additional vehicles.

Procurement Schedule Table

When a need for additional vehicles is recognized, an appropriate schedule will be developed.

Adjustment to Vehicle Supply

Accident Damaged Vehicles

There are presently no vehicles out of service due to accidents.

Stored/Rotation Vehicles

Based on an analysis of individual car mileage, MDT recognized that the range between the maximum and minimum miles logged by the rail cars was projected to grow. Given little prospect for the acquisition of additional rolling stock and the existing lease/lease-back arrangement, the need to maintain the fleet for 40 years was found to be critical. As a result, MDT revised the vehicle storage program.

Under the new storage program, up to six (6) of the highest mileage cars are stored for a period of 90 days followed by the storage of the second six (6) highest mileage cars. Each vehicle receives its regularly scheduled inspection prior to storage and is capable of returning to service immediately at the end of the 90-day storage period after receiving a storage inspection. The high mileage vehicles spend 90 days in storage and then 90 days in revenue service prior to being returned to storage if their mileage continues to rate in the top six (6). The mandatory return to revenue service after a 90-day period in storage eliminates a vehicle from remaining in storage indefinitely.

The procedure for storing and rotating Metrorail vehicles is as follows:

- Maximum of six (6) vehicles stored at any given time;
- Vehicles are removed from service for storage and rotation on a staggered schedule, not less than one (1) week apart;

- Vehicles are placed in storage after the regularly scheduled vehicle; preventive maintenance inspection has been completed;
- Vehicles not required for passenger service and/or assigned to maintenance are considered for inactive storage;
- Vehicles selected for storage will be those that have accumulated the highest mileage;
- Only vehicles that are ready for revenue service are stored;
- Once committed to storage, vehicles are not removed from storage until the 90-day period has ended;
- No preventive maintenance inspections are performed on stored vehicles other than a 30-day battery PM;
- When vehicles are removed from storage and returned to active service, they resume the same PM schedule as prior to storage; and
- Maintenance Control is responsible for scheduling vehicles into and out of storage, maintaining and monitoring the necessary records so as to ensure compliance with the approved PM program.

Three married pairs are currently assigned to storage/rotation. A summary of vehicle storage/rotation is presented in Table 3-1.

Table 3-1 Metrorail Stored Vehicle Rotation

Vehicle Pair	Date Stored	Date Removed	Days Stored	Cumulative Mileage 09/30/01
101-102				639,000
103-104	06/17/97	07/07/99	750	500,800
105-106	11/02/99	12/03/99	31	825,900
107-108	05/22/99	06/25/99	34	
	07/29/01	10/26/01	85	838,500
109-110	04/07/99	06/25/99	79	790,300
111-112	04/23/97	11/02/98	558	718,900
113-114*	04/20/01	07/18/01	89	
	11/12/01			831,600
115-116	02/19/95	08/20/00	2,009	411,200
117-118	03/01/95	08/20/00	1,999	455,600
119-120	04/21/01	07/18/01	88	830,800
121-122	10/29/00	12/19/00	51	879,600
123-124	02/18/95	03/01/95	11	
	04/15/01	07/11/01	87	820,100
125-128				734,400
127-126	02/19/95	08/05/96	533	427,400
129-130				904,600
131-132	02/19/95	07/20/97	882	715,400
133-134	02/15/95	02/07/97	723	737,400
135-136	10/21/00	12/19/00	59	871,600
137-138	11/02/98	02/01/99	91	823,600
139-140	05/23/97	05/19/99	726	725,100
141-142	02/15/95	03/01/95	14	564,900
143-144	11/02/99	12/02/99	30	
	01/14/01	04/12/01	89	905,500
145-146	03/16/99	06/14/99	90	757,800
147-148	11/17/99	12/03/99	16	769,100
149-150	07/30/01	10/12/01	74	812,100
151-152	01/05/99	04/02/99	87	798,100
153-154	07/24/97	09/01/99	769	719,500
155-156				858,400
157-158				762,800
159-160				748,500
161-162	02/11/95	03/06/97	754	722,400
163-164				700,500
165-166*	05/12/99	06/25/99	44	
	01/20/01	04/18/01	88	
	11/06/01			878,500

Vehicle Pair	Date Stored	Date Removed	Days Stored	Cumulative Mileage 09/30/01
167-168	02/10/95	08/05/96	542	670,100
169-170	02/22/95	04/10/97	778	721,700
171-172	03/01/95	06/12/97	834	419,900
173-174	02/14/95	05/20/97	826	677,500
175-176	02/15/95	06/12/97	848	719,400
177-178				839,100
179-180				813,300
181-182	10/21/00	12/19/00	59	875,200
183-184	02/01/99	05/03/99	91	746,100
185-186	06/18/99	06/25/99	7	836,400
187-188	02/24/96	01/06/97	682	644,400
189-190*	01/13/01	04/12/01	89	
	11/06/01			862,300
191-192	11/21/99	12/03/99	12	823,200
193-194				768,800
195-196	02/19/95	03/01/95	10	
	07/13/01	10/07/01	85	822,000
197-198	03/01/95	01/05/99	1,406	551,500
199-200	03/01/95	03/16/99	1,476	671,100
201-202				773,300
203-204	01/27/97	11/13/98	655	672,200
205-206	11/09/99	12/02/99	23	774,900
207-208				623,500
209-210	03/14/97	10/28/99	958	674,400
211-212	03/17/97	03/29/00	1,108	651,600
213-214	11/08/99	12/03/99	25	811,800
215-216				624,800
217-218	11/02/98	02/05/99	95	847,300
219-220	06/21/99	06/24/99	3	681,800
221-222				742,700
223-224				809,100
225-226				782,401
227-228	05/10/99	06/25/99	46	832,400
229-230	02/02/99	05/06/99	93	808,000
231-232	02/12/95	03/01/95	17	825,200
233-234				741,800
235-236	11/19/98	02/16/99	89	762,500

*Indicates a currently stored vehicle pair

Car Modernization – Midlife Overhaul

The Office of Management and Budget has committed to pledging a portion of the local option gas tax to issue $140 million in bonds to fund the Metrorail and Metromover vehicle rehabilitation programs. The 2002–2007 capital program includes $119 million for the Metrorail vehicles overhaul, beginning with planning and engineering funds, in FY 2002.

A request to advertise for Consultant Services to develop bid documents for Metrorail and Metromover vehicle fleet modernization was processed through the Expedite Ordinance and has been sent to the County Manager's office for approval.

The schedule for the Rail Mid-Life Modernization RFP Process is outlined in Figure 3-1, and the preliminary schedule for the Rail Vehicle Mid-Life Modernization is detailed in Figure 3-2.

Field Engineering is planning for the complete rail fleet mid-life modernization to begin in October 2003. Mid-life modernization is intended to:

- Upgrade and modernize systems for improved performance;
- Eliminate increased levels of obsolescence currently being experienced because replacement parts are no longer produced; and
- Bring the cars to a "like new" condition in preparation for the second half of fleet life.

Work will be contracted out due to the scope of work to be performed and the nature of the facilities required to support the project. Field Engineering will develop specifications and schedules in conjunction with the Consulting Services Contractor. The estimated time frame to complete modernization, at 2 vehicles per month, is 6 years from the start of the program.

The Scope of Work could include replacement of items listed in Table 3-2.

Table 3-2 Modernization Replacement Items

Typical Mid-Life Modernization Replacement Items	
Wiring	Door operators
Floors	Interior panels
Cabs	Seating
Heating and air conditioning	Interior lighting
Propulsion equipment	Vehicle diagnostic system
Auxiliary power supplies	Truck Equipment
Brake systems	Suspension
Air compressors	Couplers
Door controls	Draft gear

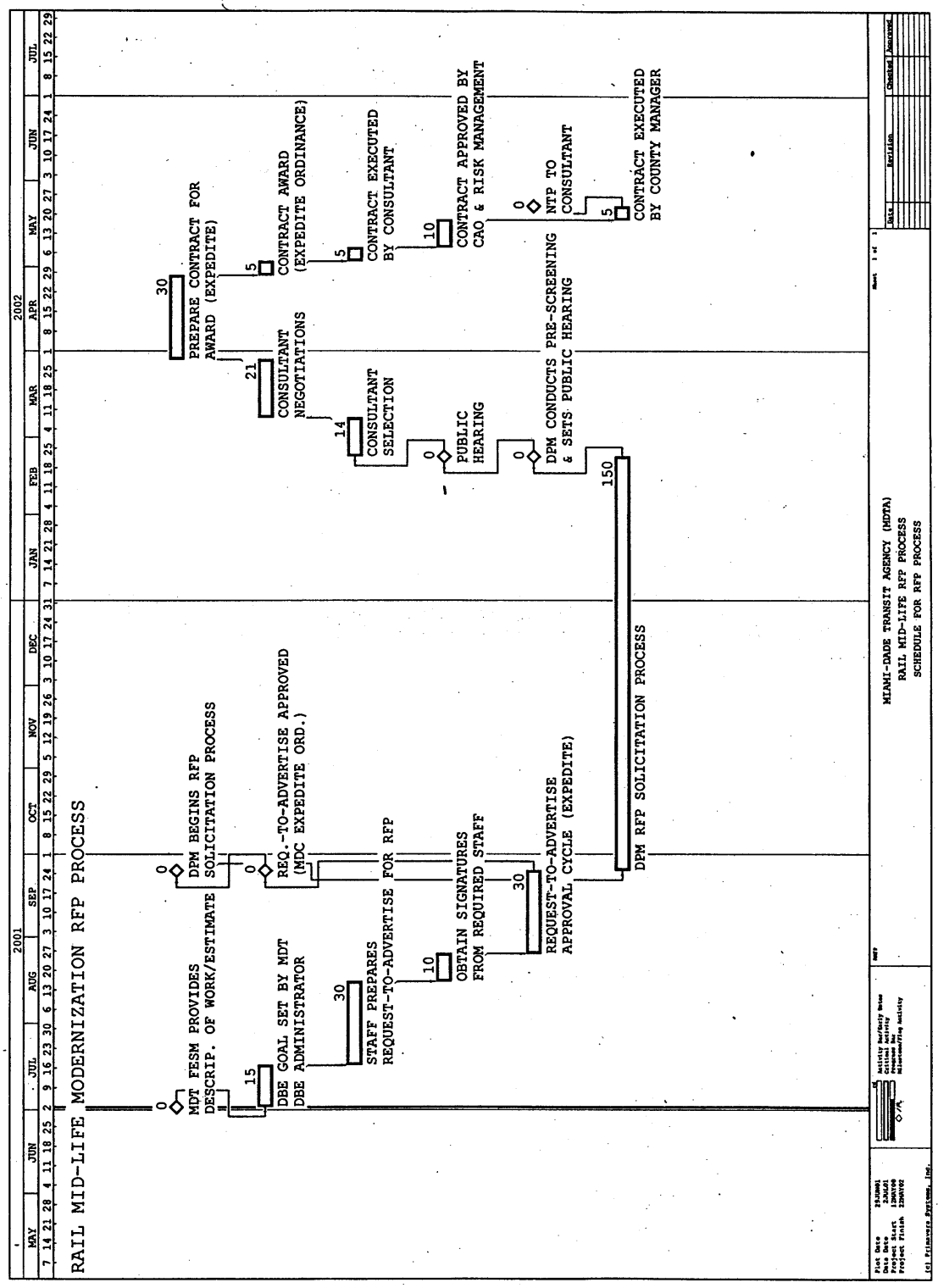


Figure 3-1 Rail Mid-Life RFP Process

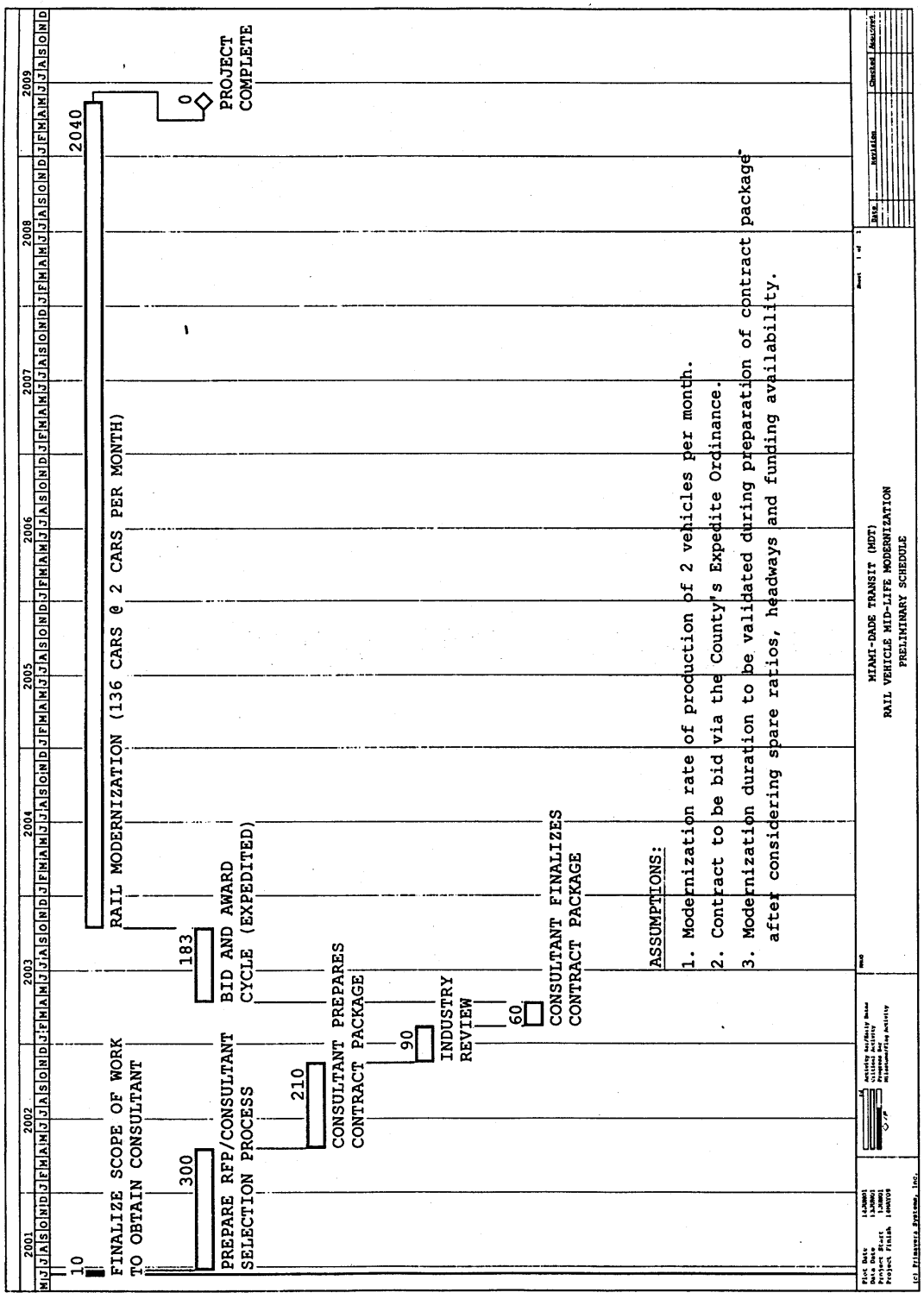


Figure 3-2 Rail Mid-Life Modernization Preliminary Schedule

Vehicle Supply and Demand During Modernization

MDT must insure an adequate supply of revenue vehicles to maintain service during the rail-car midlife modernization. Factors included in the allocation of vehicles are revenue vehicle requirements, FTA's OSR, and the use of a 20% spare ratio to meet scheduled and unscheduled maintenance needs. Table 3-3 presents a variety of scenarios that include the impact of varying Peak Vehicle Requirements on the OSR and the availability of vehicles for modernization.

Table 3-3 - Varying Revenue Vehicle Requirements

Fleet	*Peak Revenue Vehicle Requirement*	*Fleet Minus PVR*	*FTA Operating Spare Ratio*	*20% Spare Ratio*	*Total Vehicle Requirement*	*Available for Modernization*
136	116	20	17.2%	24	140	-4
136	114	22	19.3%	24	138	-2
136	112	24	21.4%	22	134	2
136	110	26	23.6%	22	132	4
136	108	28	25.9%	22	130	6
136	106	30	28.3%	22	128	8
136	104	32	30.8%	22	126	10
136	102	34	33.3%	20	122	14
136	100	36	36.0%	20	120	16
136	98	38	38.8%	20	118	18
136	96	40	41.7%	20	116	20

Using FTA's formula to calculate the Operating Spare Ratio, Table 3-3 shows the OSRs generated by varying PVRs based on the 136-car fleet. OSRs that fall within the range of 20% are bordered by a bold outline. As indicated above, all PVRs below 108 generate a relatively high OSR.

It was assumed that approximately 20% of the PVRs will need to be used as spares to meet scheduled and unscheduled maintenance needs. That 20% spare ratio, when combined with the corresponding PVR, equals the total vehicle requirement. Based on a 136-car fleet with a 20% spare ratio, the maximum PVR available to MDT is 112 with an allowance of 2 cars available for modernization.

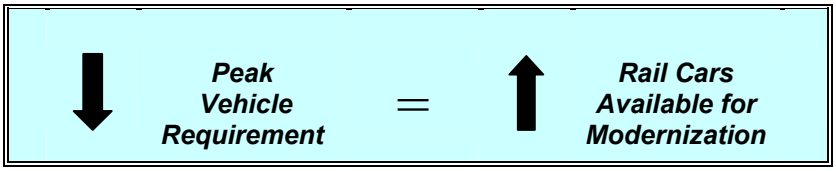
In Table 3-4, the vehicles available for modernization were subtracted from the total fleet, and the FTA OSR was recalculated based on the actual fleet that would be available during modernization. MDT's current PVR of 108, bordered by a bold outline, provides 6 cars for modernization, assuming a 20% spare ratio for maintenance needs. It should be noted that the use of a 20% spare ratio for scheduled and unscheduled maintenance needs is significant due to the fact that

MDT's spare ratio (ratio of maintenance total to PVR) ranged from 31.7% to 25.9% since FY 1999, while maintenance requirements ranged from 26-28 vehicles. The allocation of vehicles to the modernization program will reduce fleet size, thereby reducing the need for some percentage of scheduled and unscheduled maintenance vehicles.

Table 3-4 Vehicles Available for Modernization

Fleet	Peak Revenue Vehicle Requirement	Fleet Minus PVR	FTA Operating Spare Ratio	20% Spare Ratio	Total Vehicle Requirement	Available for Modernization
134	112	22	19.6%	22	134	2
132	110	22	20.0%	22	132	4
130	108	22	20.4%	22	130	6
128	106	22	20.8%	22	128	8
126	104	22	21.2%	22	126	10
122	102	20	19.6%	20	122	14
120	100	20	20.0%	20	120	16
118	98	20	20.4%	20	118	18
116	96	20	20.8%	20	116	20

The relationship between the peak vehicle requirement and rail car availability for modernization is presented in the following graphic. By reducing PVR, car availability for modernization increases. The converse is also true. By decreasing car availability for modernization, car availability to meet peak vehicle requirements increases.



Rail Car Midlife Modernization Requirements

MDT's preliminary proposal for the midlife modernization program, outlined in Figure 3-2, proposes the program will be completed in 272 weeks at a rate of 2 cars (1 married pair) per month. Based on current estimates, several sample modernization cycles were run to determine time frames for modernization of the entire fleet based on varying modernization cycles. It was assumed that

completion of the first car-pair would require one year. Metrorail Maintenance staff estimated that, after completion of the first car-pair, a cycle of 10 weeks would be required for each remaining car. The 10-Week Modernization Cycle would be completed as follows:

- Phase A – Prepare and transport car pair – 2 weeks
- Phase B – Modernize car pair – 4 weeks
- Phase C – Complete and return car pair – 2 weeks
- Phase D – MDT acceptance of car pair – 2 weeks
- Total Modernization Cycle – 10 weeks

A production schedule based on the 10-week cycle was developed. The initial stages of the cycle are illustrated in Table 3-5.

Table 3-5 10-Week Modernization Cycle

Week #	***Status of Modernization***
1-2	Prep Pair #1 Phase A
3-48	Modernize Pair #1 Phase B
49-50	Return Pair #1 Phase C
51-52	Accept Pair #1 Phase D
53-54	Pair #2 Phase A
55-56	Pair #2 Phase B
57-58*	Pair #2 Phase B + Pair #3 Phase A
59-60	Pair #2 Phase C + Pair #3 Phase B
61-62	Pair #2 Phase D + Pair #3 Phase B + Pair #4 Phase A
63-64	Pair #3 Phase C + Pair #4 Phase B
65-66	Pair #3 Phase D + Pair #4 Phase B + Pair #5 Phase A

*Actual 10-week cycle of rotation begins

Based on a 10-week cycle, 328 rather than 272 weeks would be required to complete modernization of the entire fleet. In order to complete modernization of the entire fleet within 272 weeks based on a modernization cycle of 10 weeks, during Week 209, two pairs per cycle (starting with Pairs #41 and #42) must start the rotation and continue throughout the remainder of the 272-week modernization program. During Week 261, the last 2 pairs (Pairs # 67 and #68) would be transported for completion in Week 272. Vehicle availability would vary from 65-66 pairs during Weeks 1-208 and 268-270. From Weeks 209-266, availability would fall to 62-64 pairs, which is below the current PVR. The entire 10-week cycle based on a 272-week schedule is included in Appendix H.

In an attempt to account for possible slippage of the modernization cycles, two additional cycles, 12-weeks and 14-weeks, were analyzed. The 12-Week

Modernization Cycle would include an increase in Phase B from 4 to 6 weeks as follows :

- Phase A – Prepare and transport car pair – 2 weeks
- Phase B – Modern car pair – 6 weeks
- Phase C – Complete and return car pair – 2 weeks
- Phase D – MDT acceptance of car pair – 2 weeks
- Total Modernization Cycle – 12 weeks

A production schedule based on the 12-week cycle was developed. The initial stages of the cycle are illustrated in Table 3-6.

Table 3-6 12-Week Modernization Cycle

Week #	***Status of Modernization***
1-2	Prep Pair #1 Phase A
3-48	Modernize Pair #1 Phase B
49-50	Return Pair #1 Phase C
51-52	Accept Pair #1 Phase D
53-54	Pair #2 Phase A
55-58	Pair #2 Phase B
59-60*	Pair #2 Phase B + Pair #3 Phase A
61-62	Pair #2 Phase C + Pair #3 Phase B
63-64	Pair #2 Phase D + Pair #3 Phase B
65-66	Pair #3 Phase B + Pair #4 Phase A

*Actual 12-week cycle of rotation begins

Based on a 12-week cycle, 460 rather than 272 weeks would be required to complete modernization of the entire fleet. In order to complete modernization of the entire fleet within 272 weeks based on a modernization cycle of 12 weeks, during Weeks 71-72, two pairs per cycle (starting with Pairs #5 and #6) must start the rotation and continue throughout the remainder of the 272-week modernization program. During Week 257, the last 2 pairs (Pairs # 67 and #68) would be transported for completion in Week 270. Vehicle availability would vary from 65-67 pairs during Weeks 1-76 and 264-268. From Weeks 78-262, availability would fall to 64 pairs, which is below the current PVR. The entire 12-week cycle based on a 272-week schedule is included in Appendix H.

Based on the 14-week cycle that increased Phase B to eight weeks, vehicle availability proved to be further compromised and ranged from 59-66. The 14-Week Modernization Cycle is included in Appendix H.

A comparison of the three cycles is illustrated in Table 3-7.

Table 3-7 Varying Modernization Cycles

Modernization Cycle	*Car Requirement*	*Pair Availability*
10-week cycle over 272 weeks	12-8 cars	62-64
12-week cycle over 272 weeks	8 cars	64
14-week cycle over 272 weeks	18-4 cars	59-66

It appears that an aggressive schedule of rail car modernization will affect the supply of revenue vehicles. A significant amount of coordination will be required to ensure maximum allocation of rail cars for modernization and complete the project in a reasonable time frame while maintaining a high level of consistent, reliable, and frequent customer service. The peak vehicle requirement drives the number of rail cars available for modernization. MDT staff, working in conjunction with the Rail/Mover Re-hab Consultants, will develop a schedule that provides maximum allocation of the existing fleet. Samples of various options available to MDT staff to maximize use of the fleet by reducing the PVR are presented in Table 3-8.

Table 3-8 Options for Reducing the PVR

PVR Can Be Reduced By:	*Rail Car Requirement*	*Load Factor*	*Passenger Capacity*
Lengthen Headway			
6-minute headway requires 16 trains	96	1.00	7,104
7.5-minute headway requires 13 trains	78	1.00	5,772
Reduce Car Consist from 6-cars → 4-cars			
6-minute headway with 6-car trains	96	1.00	7,104
6-minute headway with 4-car trains	64	1.00	4,736
7.5-minute headway with 6-car trains	78	1.00	5,772
7.5-minute headway with 4-car trains	52	1.00	3,848
Increase Passenger Load			
6-minute headway with 6-car trains	96	1.00	7,104
6-minute headway with 6-car trains	96	1.24	8,832
6-minute headway with 6-car trains	96	1.50	10,656
7.5-minute headway with 6-car trains	78	1.00	5,772
7.5 minute headway with 6-car trains	78	1.24	7,176
7.5-minute headway with 6-car trains	78	1.50	8,658
Combination of Factors			
6-minute headway with 6-car trains	96	1.00	7,104
7.5-minute headway with 6-car trains	78	1.24	7,176
5-minute headway with 4-car trains	76	1.50	8,436
6-minute headway with 4-car trains	64	1.50	7,104

APPENDICES

APPENDIX A	Draft Standard Operating Procedure 81.48: Metrorail Mainline Sweep Train Procedure
APPENDIX B	Sample Transit “D” Mechanical Inspection Package
APPENDIX C	Sample Transit “D” Electrical Inspection Package
APPENDIX D	Sample Pre-Operational “S” Inspection of Stored Cars
APPENDIX E	List of Components Replaced on the F & G Inspections
APPENDIX F	List of Rail Vehicle/Mileage/Hours by Pair (September 2001)
APPENDIX G	Sample Rail Operations Maintenance Program Policy
APPENDIX H	Rail Modernization Cycles

APPENDIX A

Draft Standard Operating Procedure 81.48: Metrorail Mainline Sweep Train Procedure

MIAMI DADE TRANSIT RAIL TRANSPORTATION STANDARD OPERATING PROCEDURE		
APPROVAL: _____	**EFFECTIVE DATE:**	**NUMBER:** 81.48
DATE: _____	**PAGE:** 1 of 4	**REVISION:**
SUBJECT: Metrorail Mainline Sweep Train Procedure		

1.0 AUTHORITY

Assistant Director Transit Services

2.0 PURPOSE

The purpose for this document is to provide guidelines to Rail Traffic Controller(s) and Train Operators who are to provide a Guideway sweep operation in preparation for passenger service. The sweep is to ensure that the Guideway is clear of foreign objects, interlocking switches are functioning and to provide verification that there is proper train detection in all track circuits.

- Sweeps may be provided as directed by the Rail Traffic Controller when any service interruptions are sufficiently long to justify need for a Guideway sweep.

3.0 APPLICATION

This procedure applies to preparations for revenue service to assure system integrity, safety and comfort for patrons commencing each A.M. and may be repeated at any point during the day if deemed necessary by the Rail Traffic Controller or proper authority.

4.0 ASSOCIATED EQUIPMENT

Flashlight
Metrorail Operation Rules and Procedures Manual
Metrorail Sweep Train Procedure
Hand-held Radio
Train with operational Communications Control Unit (CCU)
Train Keys
Operational Train Control Console
Operational Train Control Mimic Board

5.0 DEFINITIONS

Proper Authority – That office or individual responsible for administering procedures within the framework of established policies. Lines of authority are established within each division, and exhibited by organizational charts.

Signal – A device conveying a visual message to the Operator of a rail mounted vehicle concerning conditions affecting movement. The appearance of the signal as viewed by the Operator is its ASPECT. The information conveyed by the aspect is the signals' INDICATION. The description of the indication is the signals' NAME.

Mainline – the tracks controlled by Automatic Train Control consisting of interlockings, pocket tracks, turnback tracks, tail tracks, leads into yard area.

Main Track – A designated track upon which trains are operated by cab signals, fixed signals or both when authorized by the Rail Traffic Controller, and in accordance with the Rules.

Cab Signal – A signal on the Train Operator's Upper Panel, which indicates a permissible speed as prescribed by the Rules.

Slow Speed – Not exceeding 28 mph.

Interlocking Signal – A fixed wayside signal, which governs movements into or within interlocking limits.

Procedure – A series of steps followed in a definite order necessary for the completion of a given task. (Note: A Procedure is subordinate to a Rule).

Train Operator – An employee having direct and immediate control and responsibility for the movement of the train.

Abnormal Condition – Any unplanned situation, which requires corrective action to avoid an unsafe or emergency condition.

Guideway – A fixed or dedicated path along which any rail mounted vehicle travels.

Interlocking – A system of interconnected tracks, switches and signals which permits Metrorail Vehicles to enter or alter their routes and prevents conflicting signal indications.

Operating Modes –

Automatic Train Protection (ATP) – The subsystem within the (ATC) system that detects the presence of a train, prevents collisions, provides route interlockings and sends speed commands to the train.

Manual Mode – Train movement is controlled by the Train Operator. If he/she fails to comply with cab signals, the Automatic Train Protection system initiates a penalty brake application.

Rail Traffic Controller – An employee given the responsibility to direct, control, monitor and authorize all mainline activities for Metrorail operations.

Readback – To verbally repeat an instruction acknowledging receipt and understanding.

Time Repeated – Official time transmitted by the Rail Traffic Controller indicating that an instruction has been issued and read back correctly. Once time repeated is given by the Rail Traffic Controller, proceed with the instructions.

6.0 PROCEDURE

6.1 All communications must be brief, concise and business-like.

6.2 The Rail Traffic Controller shall direct Guideway sweep operations using the following Guidelines:

6.2.1 Establish alternating routes for each Sweep Train through Interlockings as required.

6.2.2 Insure the proper alignment of all corresponding track switches.

6.2.3 Insure that there is no other conflicting train movements in the areas where the Sweep Trains will operate.

6.2.4 Traffic Controller will give the following instructions to each Train Operator who will be operating a Sweep Train:

Train Operator (Name and Radio call number) on signal may proceed as a sweep train, manual mode ATP normal speed not exceeding 28MPH, exercising all interlocking on signal, all signs and signals are in effect.

6.2.5 The Rail Traffic Controller shall enter the Train Operators' report in the Daily Log.

6.3 The Train Operator operating a sweep train will:

6.3.1 Repeat all instructions from the Rail Traffic Controller to confirm his/her understanding of radio transmissions.

6.3.2 Visually inspect the track and Guideway for obstructions or defects.

6.3.3 Upon completion of the sweep, the Train Operator will report to the Rail Traffic Controller the condition of the tracks.

7.0 RULES

Sweep Train

Rule 4122
A complete sweep of mainline tracks will be made prior to passenger service each AM in order to ensure that the Guideway is clear of foreign objects, interlocking switches are functioning properly, as well as provide verification that there is proper train detection in all track circuits.

Rule 4123
Sweeper trains shall operate in manual mode not exceeding slow speed (28 mph) and shall carry no passengers. Upon completion of the sweep, Train Operator will advise Rail Traffic Controller on condition of tracks before dispatching regularly scheduled passenger trains. The Rail Traffic Controller shall enter the Train Operators' report in the Daily Log.

Rule 4124
Upon completion of the mainline sweep, the sweep train may be placed in passenger service, as needed. No further track maintenance activity shall take place on a "swept track", unless there is an "unusual occurrence".

Rule 4026
Train Operators shall have their train under their control at all times

Rule 4028
Train Operators shall know their train number, run number, number of cars in the train, all car numbers.

Rule 4029
Train Operators shall maintain a constant lookout in the direction of movement, particularly when rounding curves, entering stations, crossovers, on grades and through work areas for track personnel, obstructions or any other unsafe conditions.

Rule 4177
A train shall not pass an interlocking signal displaying "STOP" or not illuminated except as authorized by the Rail Traffic Controller/Rail Yard Master or as prescribed in Rule 4182.

Note: Special Circumstances

Special Circumstances and abnormal conditions may require special considerations and instructions by the Rail Traffic Controller other than those mentioned in this procedure such as disruptions in service, Work Crew on the Guideway, derailments, fatalities, severe weather or loss of power.

APPENDIX B

Sample Transit "D" Mechanical

Inspection Package

METRORAIL
TRANSIT CAR "D" INSPECTION
MECHANICAL

D

Page _____ of _____

Vehicle Pair	Start Time	End Time	Due Date	Date Completed
Hour Meter	Hubdometer	Total Hours	Supervisor initials	

JOB TIME

Employee	Classification	Employee No.	Date	Hours

Materials / Actual Time

Figure No.	Description	QTY	Figure No.	Description	QTY
0306000021	Brake Shoe		0306000021	Brake Shoe	
0401005003	Traction Motor Filter		0401005003	Traction Motor Filter	
0411001011	Propulsion Blower Filter		0411001011	Propulsion Blower Filter	
06300000002	Air Filter		06300000002	Air Filter	
0624000017	Desicant Filter		0624000017	Desicant Filter	
0903000006	Evaporator Filter		0903000006	Evaporator Filter	

QUALITY VERIFICATION OF PM TASKS

*Sections 1.1,1.2,1.3,7.2.1 to be QC by 3rd Shift Supv.

1.1	7.2.2
1.2	9.0
1.3	10.0
6.0	11.0
7.2.1	13.0

Inspected By:_____Date:_____

3rd Shift Supervisor Signature

Inspected By:_____Date:_____

Supervisor Signature

Inspected By:_____Date:_____

Chief Supervisor Signature

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

SPECIAL INSTRUCTIONS:	A	B	C	D	CODE A	CODE B	INIT A	INIT B
1) RECORD THE HUB MILEAGE AND HOUR METER READING ON THE COVER SHEET.								
2) PUT YOUR INITIALS NEXT TO ALL COMPLETED TASKS.	60	120	180	360				
3) IT IS A VIOLATION OF AGENCY RULES AND REGULATIONS TO SIGN OFF ITEMS WITHOUT EXECUTING THE TASK.								
4) ALL REFERENCES ARE LOCATED IN THE O.E.M. MANUAL.								

CAR BOTTOM									
1.0	**BLOWPIT SERVICE**								
1.1	Blow out propulsion blower, air compressor motor, and Traction motor (use 30 psig or less).	*	*	*	*				
1.2	Wash a/c condensor coils.	*	*	*	*				
1.3	Replace propulsion blower filters.	*	*	*	*				
1.4	Remove the three metal prefilters on the propulsion blower box and pressure wash thoroughly. Use no cleaners. When re-installing, note the air flow direction on the side of the filter. The arrow should point into the box.	*	*	*	*				
1.5	Clean collector mounting brackets, fusebox, and arc sheild.	*	*	*	*				
1.6	Clean traction motor filters.	*	*	*	*				
1.7	Clean equipment box covers.			*	*				
1.8	Check condition and operation of air horn. Adjust volume if necessary. (Ref. 2.5.11)	*	*	*	*				
2.0	**CARBODY**								
2.1	Check condition of end cap. (Ref. 2.2)				*				
2.2	Visually inspect all undercar equipment mounting brackets. (Ref. 1.4.3)			*	*				
2.3	Check car body displacement at bolster hanger.			*	*				
3.0	**COUPLERS AND DRAFT GEAR**								
3.1	Inspect circle bar for loose bolts, unusual wear, and damages. Lubricate wearing surface as necessary. (Ref. 7.2.10)		*	*	*				
3.2	Inspect anchor weldment for damage and wear. (Ref. 7.2.11)				*				
3.3	Inspect draw bar assembly for damage and wear. (Ref. 7.2.5)				*				
3.4	Degrease the Mechanical Coupler Yoke Pin head (side opposite the castle nut), and inspect for circular corrosion ring. Check for any signs of failure where the Yoke Pin Shank is welded into the head. If a problem is found, create a VMR and inform supervisor.				*				
4.0	**DRAFT GEAR AND YOKE ASSEMBLY**								
4.1	Inspect for damage and wear. (Ref. 7.2.10)				*				
4.2	Lubricate the yoke assembly, yoke pin, and anchor pin. Use Alvania #2 grease. Repeat item 3.4 for the Draw Bar Yoke Pins.		*	*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
4.3 Check coupler BP and MR airline seals for cracking, dry rotting, chipping, and displacement. Replace if necessary.			*	*				
4.4 Ensure springs, chains, and hooks are in place on centering Device assembly. (Ref. 7.2.1.3.2)	*	*	*	*				
5.0 MECHANICAL COUPLER								
5.1 Inspect for damage and wear.	*	*	*	*				
5.2 Lubricate the manual release shaft, hook, and guide pins. Use Alvania #2 grease.			*	*				
5.3 Check for proper hook operation and displaced cam bushings.	*	*	*	*				
6.0 CURRENT COLLECTOR								
6.1 Check blown fuse indicator for status of fuse. Check brackets, arc shields, and fuse box for damage. (Ref. 3.5.1.1)	*	*	*	*				
6.2 Check collector paddles for uniform wear, broken paddles, and excessive burning.	*	*	*	*				
6.3 Change collector shoe if worn to 0"-1/8" over the wear indicator circle.	*	*	*	*				
6.4 Check on and off rail height collector paddles and paddle pressure per manual. Check for looseness and cotter pin. If necessary, re-torque to 90-95 Ft-Lbs.	*	*	*	*				
6.5 Change collector shunt if 50% worn. Check shunt hardware for tightness, 30 Ft-Lbs.	*	*	*	*				
7.0 PROPULSION								
7.1 **TRACTION MOTOR (Ref. 4.12.5.6)**								
7.1.1 Lubricate pinion end roller bearings. Use Alvania EP1.			*	*				
7.2 **GEAR UNIT (Ref. 4.13.5)**								
7.2.1 Change oil. Before draining oil, inspect for fresh oil leakage. If fresh oil leakage is present, check for low oil level. If oil level is significantly below ¾" at the inspection port, write a VMR for leakage. If there is no fresh oil leakage, change the oil and inspect for metal particles. If metal particles are present, perform task 7.2.3, otherwise, complete the oil change. Coat threads and safety wire the drain and inspection plugs together. Fill the gear case to ¼" below the inspection port. Do not over fill.				*				
7.2.2 Check oil level. Inspect for fresh oil leakage as described in task 7.2.1 above. If oil is below ¾" of the bottom of the inspection port, fill to within ¼". Coat threads and safety wire the drain and inspection port plugs together.	*	*	*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
7.2.3 Perform SWAN diagnostics. (Criteria to be provided). Note: The SWAN diagnosis may result in additional procedures, such as adjustment of low speed bearing end-float, backlash measurements, or internal visual inspection.			*	*				
7.2.4 After SWAN diagnostics are performed, remove the high speed resevoir cover and check magnet for metal particles. If chips are present, or if gold or copper-colored particles are present, do not clean particles from magnet; hold gear unit for engineering inspection. Otherwise, clean out resevoir. Remove any sediment from the lower surface. Check that all three feed holes are fully open. When replacing the cover, check that the sealing area is clean, and the sealing washers are in good condition. Torque each screw to 17 Ft-Lbs.				*				
8.0 COUPLING								
8.1 Check coupling exterior and surrounding area for excessive grease throw-off. Clean off all grease build-up. If there is excessive grease throw-off, check lubricant per procedure and perform task 8.3 below. If necessary, add lubricant. Use Welco #M55232AX grease. (Ref. 4.14.4.3)	*	*	*	*				
8.2 Check lubricant level and add grease as required by manual. Use Welco #M55232AX grease.			*	*				
8.3 Ensure all lubrication port plugs are in place by turning axle 360 degrees. There may be up to four (4) plugs.			*	*				
9.0 TRUCKS AND SUSPENSION								
9.1 Drop trucks to the shop floor and push them out of the way to inspect the bolster bearing plates and the plate welds with a solvent and carefully inspect plate surfaces and welds for cracks. If any crack, regardless of size or shape, is found, remove bolster for repair. DO NOT RETURN TO SERVICE.			*	*				
9.2 Check side bearing assemblies on the truck side frame. Ensure bearing wear is normal, and the assembly is not tilted. Adjust/replace as necessary.			*	*				
9.3 Using a soft brush, degrease and carefully inspect all areas and weld on both sides of the journal clamp hinge for cracks. If cracks are found, remove truck from service and notify supervisor.	*	*	*	*				
9.4 Visually inspect traction motor/gearbox coupling screws, bellhousing bolts, and all motor mounting hardware. (Ref. 3.0)	*	*	*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
9.5 Gape wheel for high, vertical narrow flanges, hollow thread, and diameter limit. If you find any wheel defect, inform your supervisor immediately. Use AAR standard 1 ½ " HFG and 1 1/16" TFG.	*	*	*	*				
9.6 Check wheels and axels for thermal damage, loose and/or damaged bearings, loose wheels, cracks.	*	*	*	*				
9.7 Inspect shock absorbers for excessive leakage. Check mounting hardware. Replace/tighten as necessary.	*	*	*	*				
9.8 Check all rubber components and replace all cracked, missing, or worn items. (Ref. 3.2.3)			*	*				
9.9 Visually inspect air springs for cuts and rubber deterioration. Replace as necessary.			*	*				
9.10 Check truck pneumatic piping for loose connections, leaks, damage, and ruptured hoses.	*	*	*	*				
9.11 Check all bolt torque stripes for displacement. If stripes are displaced, check torque.				*				
9.12 Check all safety-wired hardware for looseness.				*				
9.13 Check condition of radius rods including bushing. Check and replace missing hardware. Check anchor assembly and torque value of anchor mounting bolts (250-275 Ft-Lbs). Re-torque if needed.			*	*				
9.14 Record hubdometer and hour meter reading.	*	*	*	*				
9.15 Check condition of ATP and PSS antennas.	*	*	*	*				
9.16 If vehicle is equipped with wheel flange lubricators, perform steps below:	*	*	*	*				
a. Inspect/adjust brackets. Torque values are: 300-350 Ft-Lbs for Large #1 Nut 30-35 Ft-Lbs for all Small nuts	*	*	*	*				
b. Check lubrication as follows: Remove pin and pull out lubricant cassette.	*	*	*	*				
Install new lubricant block if necessary. If the cassette is completely empty, install two lubricant blocks.	*	*	*	*				
c. Re-install insert and pin.	*	*	*	*				
10.0 <u>FRICTION BRAKES</u>								
10.1 Perform inspection procedure for the following: (Ref. 6.3 & 6.4)								
10.1.1 Parking brake and magnet valve.			*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	 B	INIT A	 B
10.1.2 Check brake shoes. Replace if worn within 9/16”-3/8” thickness.	*	*	*	*				
10.2 Check D-4-S air compressor unit, 2CY3MD portion oil level.	*	*	*	*				
10.3 Visually inspect main reservoir.			*	*				
10.3.1 Drain moisture from main reservoir.			*	*				
10.4 Visually inspect emergency reservoir.			*	*				
10.5 Visually inspect supply reservoir.			*	*				
10.6 Visually inspect vented cut-out cocks.			*	*				
10.7 Visually inspect ¾” cut-out cocks.			*	*				
10.8 Visually inspect brake head portion. Check headpins.	*	*	*	*				
10.9 Lubricate brake head portion. Use EP2 grease.			*	*				
10.10 Visually inspect pipe bracket portion.			*	*				
10.11 Clean and inspect air dryer.	*	*	*	*				
10.12 Clean and inspect intercooler.			*	*				
10.13 Clean and inspect aftercooler core.			*	*				
10.14 Inspect LX air filter element.			*	*				
10.15 Inspect F-2 safety valve.				*				
10.16 Inspect F-2-A safety valve.				*				
10.17 Replace exhaust silencer.				*				
10.18 Clean, inspect, and check D-4 drain valve.				*				
10.19 Remove and replace air compressor oil filter.				*				
10.20 Remove and replace air compressor breather valve.				*				
10.21 Remove and replace desiccant filter.				*				
10.22 Remove and replace purge check valve.				*				
10.23 Remove and replace discharge filter element.				*				
10.24 Drain and replace compressor oil.				*				
10.25 Visually inspect J-3-A pipe bracket test fitting.				*				
10.26 Inspect ½” check valve.			*	*				
10.27 Inspect #8 valve for damage, leaks, and deteriorated valve protector.		*	*	*				
10.28 Inspect J-1 relay valve.			*	*				
10.29 Inspect N3E magnet valve.			*	*				
10.30 Inspect double check valve.			*	*				
10.31 Inspect variable load valve.			*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
10.32 Inspect all emv and servotrol test fittings.				*				
10.33 Inspect actuators. Replace actuator if it is leaking. Severe internal leak is indicated by the flag traveling full stroke in less than 2 minutes after brake application.	*	*	*	*				
CAR TOP								
11.0 CARBODY								
11.1 Check window glazing rubber for cracks, distortion, breaks, or leakage. Replace and/or reseal as necessary. (Ref. 2.5.3)	*	*	*	*				
11.2 Inspect passenger seats for cuts, tears, loose hardware, and in general, replace, repair, or adjust all defective components. (Ref. 2.5.5)	*	*	*	*				
11.3 Check stanchions for loose hardware and any apparent deformation. Tighten or replace as necessary. (Ref. 2.5.6)	*	*	*	*				
11.4 Inspect door hangers for excessive dirt build-up and missing bearings. Check bearing surface for adequate lubrication. If necessary, clean and lubricate with aero lubriplate or equivalent.			*	*				
11.5 Clean end door tracks and drain holes.	*	*	*	*				
11.6 Check all carbody locks/doghandles for proper operation and loose hardware. Replace and/or tighten as necessary. (Ref. 2.1.5)	*	*	*	*				
11.7 Inspect windscreens and interior panels for damage and loose hardware. Replace/repair/tighten as necessary. (Ref. 2.5.6)	*	*	*	*				
11.8 Check operator's seat and lubricate if necessary. Use EP2 grease. (Ref. 2.5.7)			*	*				
11.9 Check front and rear end door closers for proper operation.	*	*	*	*				
11.10 Check the following for cracks, scratches, damage, and loose hardware: A. Operator's console.	*	*	*	*				
B. Ceiling liners and trim.	*	*	*	*				
C. Interior panels and trim	*	*	*	*				
D. Interior floor covering. (Ref. 2.5.2)	*	*	*	*				
E. Air vents in cab and passenger area.	*	*	*	*				
F. Tighten all loose hardware.	*	*	*	*				
11.11 Check condition of emergency equipment, decals, and signs. Check expiration date of fire extinguisher. (Ref. 2.5.4)	*	*	*	*				
11.12 Check condition and operation of windshield wiper and washer system. If necessary, fill reservoir. (Ref. 2.5.9 & 2.5.10)								

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
	*	*	*	*				
11.13 Remove and clean the strip map above each passenger door if necessary.			*	*				
11.14 Inspect the HVAC ceiling panels on each end of the rail car to ensure that the tamper-proof screws are tight and that there is not more than 1/8 inch gap at the hinged end. Ensure that the panel is flush with surrounding panels and that it is properly fitted. Remove and inspect if necessary to ensure the panel is hinged properly and that the two safety chins are secured.				*				
12.0 FRICTION BRAKES								
12.1 Perform inspection procedure for the following: (Ref. 6.3 & 6.4)								
A. Service brake pressure.	*	*	*	*				
B. Emergency brake pressure.	*	*	*	*				
C. Charging and maintaining brake pressure.	*	*	*	*				
D. Brake pipi reduction.	*	*	*	*				
E. Service brake cutout (N-5-D magnet valve portion).	*	*	*	*				
F. N-6-D magnet valve portion of the A-1 emergency unit.	*	*	*	*				
G. Duplex air gage.	*	*	*	*				
12.2 Perform functional check of D-1 pilot air valve.	*	*	*	*				
13.0 HVAC								
13.1 Replace disposable outside air filters.	*	*	*	*				
13.2 Clear and vacuum non-disposable inside air filters.	*	*	*	*				
13.3 Clear and vacuum return air louvers.			*	*				

MIAMI-DADE TRANSIT
METRORAIL
BOLSTER SIDE BEARING WEAR PLATE
PM INSPECTION DETAIL SHEET

PAIR:________ PM:____ PM DUE DATE:_____ CAR NO:____ MILEAGE:_____

1. Bolster wear plates are to be inspected for cracks. Completely drop all of the trucks in this pair _____ _____ _____ _____ (scheduled every 30 days).

2. If a crack has developed notify your supervisor immediately. The equipment is out-of-service until repaired.

3. Complete detailed sketch of cracks as required, documenting crack location and length.

DATE INSPECTED:_____ SIGNATURE:_____ BADGE NO:_____ LBHRS:_____

DATE INSPECTED:_____ SIGNATURE:_____ BADGE NO:_____ LBHRS:_____

F-END BOLSER SN_____ verified SN ☐

OK-NO CRACK ON THIS PLATE: ☐
CRACKED PLATE-REMOVE FROM SERVICE: ☐
CRACK IS IN WEAR AREA: Y ☐ N ☐

OK-NO CRACK ON THIS PLATE: ☐
CRACKED PLATE-REMOVE FROM SERVICE: ☐
CRACK IS IN WEAR AREA: Y ☐ N ☐

OK-NO CRACK ON THIS PLATE: ☐
CRACKED PLATE-REMOVE FROM SERVICE: ☐
CRACK IS IN WEAR AREA: Y ☐ N ☐

OK-NO CRACK ON THIS PLATE: ☐
CRACKED PLATE-REMOVE FROM SERVICE: ☐
CRACK IS IN WEAR AREA: Y ☐ N ☐

R-END BOLSER SN_____ verified SN ☐

DESCRIPTION: IF A CRACK IS EVIDENT, COMMENT ON LOCATION OF ETC. ORIGINATED VMR:

_____

_____

_____

SUPERVISOR'S SIGNATURE:_____DATE:_____

ENGINEERING SIGNATURE:_____ DATE:_____

(If removed from service)

MIAMI-DADE TRANSIT
METRORAIL
GEAR UNIT CAMPAIGN INSPECTION

REVISED: August 25, 1999 **Insp. Type C D**

PROCEDURE:

NOTE: If Gear Unit is noted "MONITOR" on previous inspection, attached is a copy of the previous inspection's data sheet for reference. All gear units are scheduled every "C" and "D" inspection.

1. Check oil level and feel for grit and metal particles. If there is grit or metal particles, change oil.
2. Perform audible inspection of gear units for bearing noise using stethoscope.

A-CAR: Vehicle #:_____ B-CAR: Vehicle #:_____

Front-End TRUCKS # _____ (1) _____ (2) _____ (2) _____ (1)

POSITION	1	2	3	4	4	3	2	1
AXLE #	____	____	____	____	____	____	____	____
GEAR S/N	____	____	____	____	____	____	____	____
INITIALS	____	____	____	____	____	____	____	____
OK	☐	☐	☐	☐	☐	☐	☐	☐
MONITOR	☐	☐	☐	☐	☐	☐	☐	☐

TECHNICIAN

COMMENTS:_____

_____

_____

SUPERVISOR ASSESSMENT

RETURN TO SERVICE	☐	☐	☐	☐	☐	☐	☐	☐
REMOVE FROM SERVICE	☐	☐	☐	☐	☐	☐	☐	☐
VMR#:	____	____	____	____	____	____	____	____

SUPERVISOR

COMMENTS:_____

_____

_____

SUPERVISOR'S SIGNATURE:_____DATE:_____

MIAMI-DADE TRANSIT
METRORAIL
DEFECTIVE ITEMS FROM SCHEDULED INSPECTIONS

CAR NO:_____ **DATE:_____**

ITEM NO.	REPORTED BY	DESCRIPTION OF DEFECTS	ACTION TAKEN	BADGE # OR SIGNATURE

CAR NO:_____ **DATE:_____**

ITEM NO.	REPORTED BY	DESCRIPTION OF DEFECTS	ACTION TAKEN	BADGE # OR SIGNATURE

APPENDIX C

Sample Transit "D" Electrical Inspection Package

METRORAIL
TRANSIT CAR "D" INSPECTION
ELECTRICAL

D

Page _____ of _____

Vehicle Pair	Start Time	End Time	Due Date	Date Completed

Hour Meter	Hubdometer /	Total Hours	Supervisor initials

JOB TIME

Employee	Classification	Employee No.	Date	Hours

Materials — Actual Time

Figure No.	Description	QTY	Figure No.	Description	QTY
0401004007	Traction Motor Brush		0401004007	Traction Motor Brush	
0411001029	Prop Blower Motor Brush		0411001029	Prop Blower Motor Brush	
0911000031	Evap Blower Motor Brush		0911000031	Evap Blower Motor Brush	

QUALITY VERIFICATION OF PM TASKS

SECTION INSPECTED	
5.0	6.6
6.0	6.9
6.3	7.0
6.4	10.0
6.5	15.0

Inspected By:_____Date:_____

Supervisor Signature

Inspected By:_____Date:_____

Supervisor Signature

SEAL # INSTALLED	**APPLIED TO CAR #**	**SEAL # REMOVED**	**SEAL INSTALLED BY EMP / SUP SIGN**	**DATE**	**SEAL POSITION**

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

SPECIAL INSTRUCTIONS:	A	B	C	D	CODE		INIT	
					A	B	A	B
1) RECORD THE HUB MILEAGE AND HOUR METER READING ON THE COVER SHEET.								
2) PUT YOUR INITIALS NEXT TO ALL COMPLETED TASKS.	60	120	180	360				
3) IT IS A VIOLATION OF AGENCY RULES AND REGULATIONS TO SIGN OFF ITEMS WITHOUT EXECUTING THE TASK.								
4) ALL REFERENCES ARE LOCATED IN THE O.E.M. MANUAL.								

CAR BOTTOM								
1.0 COUPLERS AND DRAFT GEAR								
1.1 ELECTRICAL COUPLER (Ref. 7.2.2.2)								
1.1.1 Inspect and operate lever.	*	*	*	*				
1.1.2 Check piston diaphragm.			*	*				
1.1.3 Cycle test unlocking cylinder.			*	*				
1.1.4 Clean pins, adjust if necessary.	*	*	*	*				
1.1.5 Inspect and replace outside rubber seal if excessively deteriorated.			*	*				
1.2 ELECTRIC COUPLER CONTROL BOX								
1.2.1 Inspect control box.	*	*	*	*				
1.2.2 Check operation of switch and cable assembly guage switch setting.	*	*	*	*				
1.2.3 Clean pins.	*	*	*	*				
2.0 HVAC								
2.1 **COMPRESSOR/CONDENSER ASSEMBLY (B-4546) (Ref. 9.6)**								
2.1.1 Check motor brushes and commutators. Remover excessive build-up of dirt. Change brushes if 9/16" or less in length.	*	*	*	*				
2.1.2 Check compressor oil level, receiver R-22 level, moisture indicator color, and condenser coil contamination.	*	*	*	*				
2.1.3 Check refrigeration control box for loose connections and damaged equipment.	*	*	*	*				
2.1.4 Check temperature control box, circuit breaker and contactors, relays, and logic module.	*	*	*	*				
2.1.5 Check height of resilient mounts and rebound cushions.			*	*				
2.1.6 Check resistor assemblies.	*	*	*	*				
3.0 PROPULSION EQUIPMENT BLOWER F187 (Ref. 4.8.0)								
3.1 Inspect shunt wear marker locations. Replace brush when wear marker is at top of holder guide (or 3/8" long).	*	*	*	*				
3.2 Check that brush has sufficient clearance to slide freely.	*	*	*	*				
3.3 Check and tighten all bolted connections.				*				
3.4 Check for excessive dirt build-up on the blower blades and clean.				*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
3.5 Check for excessive deterioration of rubber brushings.				*				
3.6 Inspect the canvas air ducts between the blower and the semiconductor box, and the two canvas ducts at the motor reactor for holes or tears. Repair or replace if necessary.	*	*	*	*				
3.7 Ensure that all clamping around each canvas duct is secure.	*	*	*	*				
3.8 Inspect blower bag for holes and deteriorated fabric. Replace if necessary.		*	*	*				
3.9 Inspect commutator surface for signs of grooving, treading, high bars, or out of roundness. If grooved, check depth with micrometer for 0.040 inch max. depth.	*	*	*	*				
3.10 Check for noisy bearings.	*	*	*	*				
4.0 CONVERTER 359B (Ref. 4.11.0)								
4.1 Inspect for loose wiring, blown fuses, damaged components.			*	*				
4.2 Wipe down and clean. (Use Transit Clean)			*	*				
4.3 Check wipe of KC1, KC2, and KC3 contacts. Change as necessary.			*	*				
5.0 BATTERY								
5.1 Check electrolyte level for all cells. If level is below maximum mark in any cell, fill to mark with distilled water only. Check connections and ensure that connector covers are properly installed. Check condition of battery box including damage which may affect ventilation. Check box hardware to verify its integrity.	*	*	*	*				
5.2 Wash batteries and compartment box with water hose.				*				
5.3 Check individual cell voltages (1.5Vdc/cell at full charge).				*				
6.0 PROPULSION								
6.1 **TRACTION MOTOR (Ref. 4.12.5)**								
6.1.1 Inspect brushes as follows: (Replace if necessary)								
A. Check wear indicator on shunt. Replace brush if indicator is at top of holder guide (or if work to 1" length). (Ref. 4.12.5.1)	*	*	*	*				
B. Check for breakage, chipping, and cracking.	*	*	*	*				
C. Check for loose or frayed shunts.	*	*	*	*				
D. Check that brushes move freely in holder.	*	*	*	*				
6.1.2 Check brush holders as follows:								
A. Check brushholders for arcing, flash over, carbon residue, and secureness.	*	*	*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
B. Check insulators for chipping, cracks, carbon residue and looseness.	*	*	*	*				
C. Check springs for damages and displacement.	*	*	*	*				
NOTE: If necessary, clean above with CRC/BIG BATH								
6.1.3 Inspect commutator surface for signs of grooving, threading, and high bars. (Ref. 4.12.5.7)	*	*	*	*				
6.1.4 Inspect commutator creepage band. Clean with solvent and wipe free of all dirt.	*	*	*	*				
6.1.5 Check commutator runout using the dial indicator if brush shunts are frayed; or brushes are chipped, cracked, excessively worn, or arced; or if runout is greater than 0.004", hold for engineering inspection.				*				
6.1.6 Inspect commutator covers for the following:								
A. Damaged or deteriorated filter elements.	*	*	*	*				
B. Worn top mounting hole. Replace if hole is worn within ¼" of cover edge.	*	*	*	*				
C. Bent part. Straighten and reinstall.	*	*	*	*				
D. Ensure filter element covers entire opening.	*	*	*	*				
E. Ensure that cover is installed securely.	*	*	*	*				
6.1.7 Check that cable terminals in lead cleat assemblies are tight.				*				
6.1.8 **REMOVE AXLE GROUND BRUSHHOLDER COVER AND CHECK: (Ref. 4.12.5.1)**								
A. Brush length. (Replace if less than 1.25")			*	*				
B. Check that brush slides freely in holder.			*	*				
C. Check brush shunts for evidence of fraying or overheating.			*	*				
D. Torque brush shunt terminal screw to 6 Ft-Lbs.			*	*				
E. Torque brushholder cover bolts to 17 Ft-Lbs.			*	*				
6.1.9 **CHECK TRUCK DISCONNECT**								
A. Inspect truck disconnect for secureness.			*	*				
B. Clean all contact surfaces and check contact springs for pressure. If contacts are burned or pitted, dress with a fine file.				*				
C. Tighten connectors.				*				
6.1.10 Check truck wiring including motor, current collector, and speed sensor leads. Replace any wire or cable with damaged insulation (Ref. 3.2.10)			*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
6.2 **MOTOR CONTROL BOX (Ref. 4.2.0)**								
6.2.1 Wipe down and clean. (Use Transit Clean)			*	*				
6.2.2 Check for loose hardware and connections.			*	*				
6.2.3 Ensure that air is being exhausted at the Motor Reactor and at the vent on the end of the Motor Control Box. If the exhaust seems weak, locate leakage in the blower plenum, canvas ducts, or semiconductor box seals.				*				
6.2.4 Inspect the Motor Control Box cover seals and repair if necessary.				*				
6.2.5 Open pet cock to drain condensed moisture from air system.	*	*	*	*				
6.2.6 Check air pressure at the pet cock using an appropriate pressure guage. If necessary, adjust air regulation to obtain 75 (+2-0) psig.				*				
6.3 **CONTROLLER, INCLUDING LOOP, FIELD SHUNT, AND POWER BRAKE (XCD-348C, XCD-298A, XCD-298H)**								
6.3.1 Check all mounting bolts and connections for tightness. With valves energized, check all air connections for leaks.			*	*				
6.3.2 Lubricate loop field/power brake controllers with Stazon.				*				
6.3.3 Inspect main contacts. Clean or replace if worn or arced.		*	*	*				
6.3.4 Inspect arc boxes for damage. Replace or repair with arc box cement when burned halfway through.			*	*				
6.3.5 Inspect interlocks. Clean or replace if worn or arced. Adjust to 1/8”.		*	*	*				
6.3.6 Inspect shunts. Check for loose, burnt, or broken shunts. Replace when 50% of strands are open.	*	*	*	*				
6.3.7 Check the magnet valve for leakage in the de-energized position. Also check the operating cylinder and the magnet valve for leakage in the energized position by pressing down the magnet valve armature.	*	*	*	*				
6.3.8 Check relays for loose connections, pitted contacts, and damage.			*	*				
6.4 **REVERSER TYPE ERC-482 (Ref. 4.2.1)**								
6.4.1 Inspect interlocks and main contacts interlock adjustment at 1/8”.	*	*	*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
6.4.2 Test for sluggish operation of reverser. Depress each magnet valve armature all the way, one at a time. If reverser operates sluggishly, check magnet valves for air leaks or check for rough drum fingers and contacts.		*	*	*				
6.4.3 Clean and lubricate drums using EXXON Unirex #2 grease. Inspect copper drum contacts. If necessary, polish with fine sandpaper.	*	*	*	*				
6.4.4 Lubricate internal cylinder walls with M#55271-AA. Lubricate surface between shaft operating lever and piston operating rod with M#53701GC.			*	*				
6.4.5 Test piston packing. Press magnet valve armature all the way down by hand. Air should not leak past piston. If air leaks, replace piston packing cup.			*	*				
6.5 **BRAKE CONTACTORS TYPE UMA-34B AND UMD-125C. (Ref. 4.2.5)**								
6.5.1 Check main contacts for wear, flash over, arcing, and proper alignment.	*	*	*	*				
6.5.2 Inspect shunt. Replace if worn, tighten hardware if loose.	*	*	*	*				
6.5.3 Inspect are box for damage. Replace or repair with arc box cement when burned halfway through.	*	*	*	*				
6.5.4 Check for binding or sluggish operation.	*	*	*	*				
6.5.5 Check interlocks.			*	*				
6.6 **LINE SWITCH BOX – TYPE UPB-55-H (Ref. 4.5.3)**								
6.6.1 Wipe down and clean with Transit Clean.			*	*				
6.6.2 Disassemble air regulator filter bowl and examine the filter element. If it is clogged with dirt or any foreign matter, replace the element.				*				
6.6.3 Adjust air regulator to 75 (+2-0) psi for an input of 150 psi.			*	*				
6.6.4 **PRESSURE SWITCH (PAR) D- OPERATION CHECK**								
A. Increase input air pressure until switch closes – must occur above 65 psi.		*	*	*				
B. Decrease input air pressure until switch opens – must occur below 54 psi.		*	*	*				
6.6.5 **LINE SWITCHES – TYPES UPB-405, UPB-455**								
A. Check all mounting bolts and connections for tightness. With valves energized, check all air connections for leaks.				*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
B. Check the magnet valves for leakage in the de-energized position. Also, check the operating cylinder and the magnet valve for leakage in the energized position by pressing down the magnet valve armature.	*	*	*	*				
C. Inspect the main contact for wear, flash over, severe arching, and alignment. Replace if necessary.	*	*	*	*				
D. Inspect interlocks for excessive gap or closure, should be 1/8" when opened.			*	*				
E. Inspect arc chutes for damage. Replace or repair with arc box cement when burned halfway through.	*	*	*	*				
F. Inspect shunts. Check for loose, burnt, or broken shunts. Replace when necessary.	*	*	*	*				
G. Check arc chutes for rubbing parts during operation.			*	*				
6.6.6 Lubricate line switch air cylinder types UPB-405 and UPB-455. Use Stazon.				*				
6.6.7 Check propulsion blower motor resistor for loose connections and hardware, and for damaged windings.			*	*				
6.7 **REACTORS, LINE AND MOTOR (TYPE FS-81A) (Ref. 4.10.5)**								
6.7.1 Check for dirt accumulation, loose connections, loose hanger and assembly bolts, and damaged insulation.			*	*				
6.7.2 Inspect ground straps. Replace if copper strands are deteriorated, brittle, and breakage when the strap is pulled on by hand.			*	*				
6.8 **SEMICONDUCTOR BOX – TYPE TE-330 (Ref. 4.3.0)**								
6.8.1 Wipe down and clean with Transit Clean.			*	*				
6.8.2 Inspect the semiconductor box cover seals. With the system running, determine if there are any air leaks at these seals. Repair if necessary.				*				
6.8.3 Check capacitors for blown vent plugs, other leaks, can distortion, and signs of arcing.	*	*	*	*				
6.8.4 Check fault indicator on fuses.	*	*	*	*				
6.8.5 Check all bolted connections for tightness and wipe all insulators clean.				*				
6.8.6 Check that the gate pulse amplifier indicator is on when power is on and the J-Plugs secure.	*	*	*	*				
6.9 **KNIFE SWITCH BOX – TYPE TK344 (Ref. 4.6.3 and 4.6.4)**								

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
6.9.1 Lubricate jaws with Unirex #2 grease.			*	*				
6.9.2 Clean all contact surfaces and be sure that blade is gripped tightly by switch jaws.				*				
6.9.3 Check box for loose connections, mounting bolts, and damage to equipment.			*	*				
6.10 **RESISTOR ASSEMBLIES INCLUDING BRAKING, LINE CHARGING/BRAKE BUILD-UP (Ref. 4.7.0)**								
6.10.1 Clean resistor assemblies and insulators			*	*				
6.10.2 Check for open resistors and loose connections.				*				
6.11 **A-B CAR JUMPER CABLES** Inspect and ensure safety wiring is in place and correctly applied. Use 0.050" diameter SS wire.				*				
7.0 FRICTION BRAKES								
7.1 Perform inspection procedure for brake cylinder pressure switch (Ref. 6.30)				*				
7.2 Perform inspection procedure for brake pipe pressure switch.				*				
7.3 Perform inspection procedure for parking brake pressure switch.				*				
7.4 Inspect compressor control box test fitting.				*				
7.5 Inspect air compressor unit as follows: (Ref. 6.5.1)								
7.5.1 Perform inspection procedure for compressor pressure switch.			*	*				
7.5.2 Check condition of brushes. Change if ½" or less in length.	*	*	*	*				
7.5.3 Inspect motor contactor.	*	*	*	*				
7.5.4 Inspect control box control relays.	*	*	*	*				
7.5.5 Inspect control box time delay relay.	*	*	*	*				
7.5.6 Inspect control box pressure switch.			*	*				
7.5.7 Clean and inspect brush holder.	*	*	*	*				
7.5.8 Check operation of reset switch.	*	*	*	*				
7.5.9 Clean and inspect motor.	*	*	*	*				
7.5.10 Inspect and test control box solenoid valve.	*	*	*	*				
7.5.11 Inspect D-4-5 compressor resistor.				*				
CAR TOP								
8.0 CARBODY								
8.1 **RUN NUMBER SIGN (Ref. 2.5.4)**								
8.1.1 Check run number sign screws in front and back covers and rod knobs. Tighten if necessary.								

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
8.1.2 Inspect run number sign lens for cracks and crazing. Replace lens if necessary.								
8.1.3 Inspect curtains and replace if defective.								
8.1.4 Clean sign only if necessary.								
8.1.5 Check operation.								
9.0 COUPLERS AND DRAFT GEAR								
9.1 **ELECTRO-PNEUMATIC CONTROL BOX (Ref. 7.2.4)** Perform functional check.			*	*				
9.2 **SUPPLY LINE AIR FILTER (Ref. 7.2.8)**								
9.2.1 Purge accumulated water.	*	*	*	*				
9.2.2 Replace filter elements.				*				
10.0 DOOR SYSTEM (Ref. 8.4.0)								
10.1 Perform door close summary circuit functional check.	*	*	*	*				
10.2 Perform door control circuit functional and timing tests.	*	*	*	*				
10.3 Perform inspection of the door control relay panels.				*				
10.4 Perform functional check of the obstruction sensing circuit.	*	*	*	*				
10.5 Inspect motor field suppression devices on motor lead terminal strip.				*				
10.6 Inspect door operator panels for loose wiring and damaged equipment.				*				
10.7 Perform functional check of the mechanical lock assembly.			*	*				
10.8 Perform mechanical check of the extension arm assembly. Inspect “C” clips.	*	*	*	*				
10.9 Perform visual check of the exterior signal lights.	*	*	*	*				
10.10 Inspect and perform electrical check of the interior crew switches.	*	*	*	*				
10.11 Check door open limit switch. (DLS2)				*				
10.12 Inspect and perform electrical check of the exterior crew switches.	*	*	*	*				
10.13 Perform functional check of the inside emergency cable assemblies.			*	*				
10.14 Perform functional check of the exterior emergency cable assemblies.			*	*				
10.15 Perform functional check of the door control auxiliary panel.	*	*	*	*				
10.16 Check mechanical adjustments.			*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	CODE B	INIT A	INIT B
10.17 Check door test switch.				*				
10.18 Visually inspect closing resistor.				*				
10.19 Check for 3" door panel push back.				*				
10.20 Clean passenger door tracks and clear drain holes.	*	*	*	*				
10.21 Lubricate door hangers as needed with lubriplate or equivalent.			*	*				
11.0 HVAC								
11.1 **EVAPORATOR BLOWER ASSEMBLY (B-4647) (Ref. 9.6)**								
11.1.1 Check motor brushes and commutators. Remove excessive dirt build-up. Replace brush if worn to wear indicator.	*	*	*	*				
11.1.2 Inspect flexible plenum. Clean if necessary.				*				
11.1.3 Check drain pans for clogging.				*				
12.0 MISCELLANEOUS ELECTRICAL								
12.1 **AUXILIARY RELAY PANEL (Ref. 4.20.0)**								
12.1.1 Inspect for loose connections, burning or pitting contacts, loose relays, and general equipment damage.				*				
12.1.2 Inspect vital relays ER, PB, DIR, ZSR, LZSR for slow action, condensation, burned or pitted contacts, and looseness.				*				
12.1.3 Replace all missing or deteriorated tie wraps.				*				
12.1.4 Clean panel filters with water.				*				
12.2 **MASTER CONTROLLER (Ref. 4.15.6.H.R.)**								
12.2.1 Inspect deadman cam switches for:								
A. Badly frayed shunts.			*	*				
B. Worn Contacts.			*	*				
C. Broken spring.			*	*				
D. Flats on rollers.			*	*				
E. Loose mounting.			*	*				
F. Dirt accumulation.			*	*				
12.2.2 Inspect OCP and OBP receptacles for corrosion; clean out corrosion and replace pins as needed.				*				
12.2.3 **VISUAL INSPECTION**								
A. Check for general cleanliness.		*	*	*				
B. Check for lubrication of axle rollers or cam. Use drip-less oil.		*	*	*				
C. Check for loose hardware and loose electrical connections.				*				
D. Check for damages to wire insulation.				*				
E. Check for damage or creases in shunts on roller switches.				*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	 B	INIT A	 B
F. Check cams and stationary contacts for cracks and chips.				*				
G. Check the deadman unit to see that the ball rides near the midpoint of the cam.		*	*	*				
H. Check and replace deadman slot cover as needed.	*	*	*	*				
12.2.4 LUBRICATION (Ref. 4.15.6.H.R.)								
A. Lubricate the following with machine oil: detent pawl, pawl spaces (inside and outside diameter), mode interlock pivot, and pawl.		*	*	*				
B. Rotate master controller handle and check for smooth operation of deadman mechanism.		*	*	*				
C. Move master controller handle and check that detent roller rolls.		*	*	*				
D. Move mode selector switch and check for smooth operation.			*	*				
E. Check operation of on/off switch.			*	*				
F. Check potentiometer coupling for any signs of fatigue or loosening.			*	*				
G. Perform potentiometer check.			*	*				
H. Perform mechanical interlocking check.			*	*				
12.2.5 **SPEEDOMETER**								
A. Inspect for frayed or broken wires.				*				
B. Check for loose connections.				*				
C. Check for hung up indicator.				*				
13.0 FRICTION BRAKES								
13.1 **F2 UNIT**								
13.1.1 Inspect that F2 unit is secured. Check for loose or stripped mounting screws.	*	*	*	*				
13.1.2 Inspect air spring pressure transducer for air leaks. (Ref. 6.8.3H.R.)	*	*	*	*				
13.1.3 Inspect magnetic pick-up for metal particles, dirt, and loose locknut.				*				
13.1.4 Perform self test.	*	*	*	*				
14.0 COMMUNICATIONS								
14.1 Perform functional check of P.A., Intercom, and Radio. (Ref. 11.3)	*	*	*	*				
14.2 Check operation of ATP bypass alarm.	*	*	*	*				

PAIR NO.	DATE	INSPECTION CODES	1. GOOD CONDITION 2. ADJUSTED 3. REPLACED	4. FUNCTIONS OK 5. DEFECTIVE 6. CLEAN	7. LUBRICATE 8. FILL WATER/FLUID 9. DELETED

	A 60	B 120	C 180	D 360	CODE A	 B	INIT A	 B
15.0 LIGHTING								
15.1 Inspect and perform functional check of: (Ref. 10.0)								
15.1.1 Flood light.	*	*	*	*				
15.1.2 Reading light.	*	*	*	*				
15.1.3 Bold louver light/air diffuser. Clean with Transit Clean.	*	*	*	*				
15.1.4 Headlights (Clean if necessary).	*	*	*	*				
15.1.5 Marker light (Clean if necessary).	*	*	*	*				
15.1.6 Tail light (Clean if necessary).	*	*	*	*				
15.1.7 Cab dome light.	*	*	*	*				
15.1.8 Passenger intercom exterior light.	*	*	*	*				
15.1.9 Operator's panel lamp test.	*	*	*	*				
16.0 DESTINATION SIGN								
16.1 Perform functional check. (Ref. 2.5.4 and 12.0)	*	*	*	*				
16.2 Inspect for loose connections and equipment damage.			*	*				
17.0 PROPULSION LOCKER								
17.1 **ATO MODULE (Ref. 4.4.0)**								
17.1.1 Check for secure mounting and dust cover.	*	*	*	*				
17.1.2 Check operation of fan.	*	*	*	*				
17.2 **LOGIC BOX**								
17.2.1 Inspect and check for tight air fitting and connector and the security of box mounting and dust cover.	*	*	*	*				
17.2.2 Perform functional check of load weight transducer logic read-out and air pressure.			*	*				
17.2.3 Verify that hexadecimal LED display is functioning by visual inspection.				*				
18.0 P-WIRE AND BRAKE SIGNAL GENERATOR								
18.1 Check terminals for loose, frayed, or broken wires and mounting hardware for tightness.			*	*				

MIAMI-DADE TRANSIT
METRORAIL
TRACTION MOTOR RUNOUT

DATE:_____ **PERFORMED BY:_____**

CAR#				CAR #			
TM #	SERIAL #			TM #	SERIAL #		
1				1			
2				2			
3				3			
4				4			

If total runout is greater than or equal to .004", perform runout on all four tracks using Chart Recorder. Attach graphs.

MIAMI-DADE TRANSIT
METRORAIL
DEFECTIVE ITEMS FROM SCHEDULED INSPECTIONS

CAR NO:_____ **DATE:_____**

ITEM NO.	REPORTED BY	DESCRIPTION OF DEFECTS	ACTION TAKEN	BADGE # OR SIGNATURE

CAR NO:_____ **DATE:_____**

ITEM NO.	REPORTED BY	DESCRIPTION OF DEFECTS	ACTION TAKEN	BADGE # OR SIGNATURE

MIAMI-DADE TRANSIT
METRORAIL
ATP CARBOURNE EQUIPMENT
"B" AND "C" INSPECTION
WORK ORDER

B	Vehicle Pair	Target Time	Actual Time	Due Date	Completion Date
Employee		Classification		Employee No.	
C	Vehicle Pair	Target Time	Actual Time	Due Date	Completion Date
Employee		Classification		Employee No	
REMARKS					

"B" Inspected By:_____ Date:_____
Supervisor Signature

"C" Inspected By:_____ Date:_____
Supervisor Signature

Inspected By:_____ Date:_____
Chief Supervisor

PAIR NO.	DATE

SPECIAL INSTRUCTIONS:	B	C	CAR A	CAR B	INIT A	INIT B
1) PUT YOUR INITIALS NEXT TO ALL COMPLETED TASKS.	4	1				
2) IT IS A VIOLATION OF AGENCY RULES AND REGULATIONS TO SIGN OFF ITEMS WITHOUT EXECUTING THE TASK.	5	8				
3) FOR REFERENCES REFER TO US & S SERVICE MANUAL 6270.		0				

NOTE: Appropriate cleaning of the area being inspected must be completed. A helpful way to tell if problems may exist, is to check the ATP Test set and equipment appearance by using your senses of sound, smell, feel, etc. **CAUTION: Only approved cleaning materials should be used. Use contact cleaner that is oil-free and does not erode plastic. (Ref. 5.7.2)**						
1.0 **ROUTINE INSPECTION – OUTSIDE (Ref. 5.6 & 5.7)**						
1.1 **CAB SIGNAL PICK UP COILS (LEAD TRUCK CAR A & CAR B)**						
1.1.1 Check cab signal pick up coils for obvious signs of physical damage and make certain coils and spacer blocks are securely mounted to frame.	*	*				
1.1.2 Check pick-up coil cable connections to car body disconnect box for security; check cables for cuts, nicks and fraying damage.	*	*				
1.1.3 Make sure pick-up coil cable has enough slack to make sharp radius turns required at PYD and mainline.	*	*				
1.2 **SPEED SENSOR (ON CAR B)**						
1.2.1 Clean the truck-mounted components as follows: A. Using an aerosol can of electrical contact cleaner (oil-free), spray speed sensor so that all dirt and foreign matter is removed from speed sensor.	*	*				
1.2.2 Check speed sensor for secure mounting in second axle gear box housing.	*	*				
1.2.3 Check that sensor cable is tight and exhibits no obvious damage.	*	*				
2.0 **WHEEL WEAR CORRECTION ADJUSTMENT** (See US & S Manual #6270, Section 5.9.1)						
2.1 On second axle of "B" car, measure diameter of both wheels using wheel wear gauge. If diameter of wheels differ, set wheel wear to smallest diameter. If difference of two wheels is greater than .250 inches, report it to supervisor.	*	*				
Diameter of wheel 3 _____ Inches	*	*				
Diameter of wheel 4 _____ Inches	*	*				
2.2 Remove retainer plate from upper card file row in ATP rack.	*	*				
2.3 Based on the following wheel diameters, set wheel wear switch S1 to appropriate position. Circle the appropriate wheel wear setting below:	*	*				

PAIR NO.	DATE

	B 45	C 180	CAR A	CAR B	INIT A	INIT B
Wheel Diameter (in.) — S1 Setting 27.8 (NEW) — 1 27.5 — 2 27.3 — 3 27.0 — 4 26.8 — 5 26.5 — 6 26.3 — 7 26.0 — 8 25.8 — 9 25.5 — 10						
2.4 After setting wheel wear switch to appropriate position, replace card file retainer plate.	*	*				
3.0 **ROUTINE INSPECTION – INSIDE (Ref. 5.6 & 5.7)**						
3.1 Inspect the ATP rack locker in the cab as follows:						
3.1.1 Cabinet/enclosure and ATP rack is clean and free of scratches and spots of corrosion.	*	*				
3.1.2 External cable connections are tight and cables are free of nicks, cuts and fraying. Ensure that PC1, PC2, PC3, and PC4 plugs are safety-wired.	*	*				
3.1.3 Interconnecting cable connection between card file assembly and rack is tight and plug handle is in secured position.	*	*				
3.1.4 Using lint free cloths and stainless steel cleaner, clean and dry all exterior surfaces.	*	*				
3.1.5 Using a soft bristle brush, remove dust, and foreign matter from electrical connections and equipment surfaces.	*	*				
3.1.6 Using compressed air (aerosol can), blow foreign matter and dust from electrical surfaces.	*	*				
3.1.7 Check that wire harness connections between terminal board, timing capacitor, and relay mounting bases are secure and wires are free of nicks, cuts and fraying.	*	*				
3.1.8 Check that retainer quarter-turn fasteners are intact and undamaged.	*	*				
3.1.9 Check that vital relays and decelerometer are securely mounted and that vital relay placard names are clean and legible. Check all safety wires on vital relays and dual decelerometer are intact.	*	*				
3.1.10 Visually check vital relays for worn or damaged parts, pitted contacts, damaged covers and/or seals, and excessive dust accumulations.	*	*				
3.1.11 At top of rack, check that non-vital relay compartment cover is securely fastened and plexiglas window is intact and free of cracks.	*	*				

PAIR NO.	DATE

	B 45	C 180	CAR A	CAR B	INIT A	INIT B
4.0 **MINIMUM ATP SYSTEM PERFORMANCE/OVERSPEED CHECK (Ref. 5.8)**						
4.1 Interconnect the ATP test set and the ATP rack as follows: (Ref. 5.8.1)						
4.1.1 Set "Reset" circuit breaker located on top right front of rack to off (down) position.	*	*				
4.1.2 Remove shorting plug (located next to "Reset" circuit breaker) by turning locking actuator handle ¼ turn to the left.	*	*				
4.1.3 Open test set cover and connect test set cable to shorting plug socket on ATP rack; lock plug by turning locking actuator handle ¼ turn to right.	*	*				
4.1.4 Set all switches on test panel to down position, rotary switches to full CCW position, and controls to full CCW position. Set "Berthing Timing" switch to off position and "Zero Speed" switch to on position.	*	*				
4.2 **Performance Check procedure. (Ref. 5.8.12)**						
Note: During the course of any test or any test and adjustments, if any abnormal indications or conditions appear, refer to Section 5, Paragraph 5.10 of SM-6270 to isolate the malfunction(s), and repair. After completing necessary corrective maintenance, repeat the test.	*	*				
4.2.1 Set "Power Supply Input Voltage Check" control on ATP test set full CW, set "On/Off" switch to on.	*	*				
4.2.2 Set the "Reset" circuit breaker on ATP rack to on (up) position.	*	*				
4.2.3 At train operator's control console, set following controls to indicated position:						
a. KEY SWITCH: Unlock position	*	*				
b. ON/OFF SWITCH: On	*	*				
c. MSS: Man position	*	*				
d. MCL: Service brake position	*	*				
e. ATP Bypass: Normal	*	*				
f. ATO Module: On	*	*				
4.2.4 The following indicators on test set panel should be lit:						
a. EB relay energized.	*	*				
b. VZ relay energized.	*	*				
c. Service brake.	*	*				
d. MC IN brake.	*	*				
e. Over Speed.	*	*				

PAIR NO.	DATE

	B 45	C 180	CAR A	CAR B	INIT A	INIT B
f. Both zero speed lights.	*	*				
4.2.5 At this point, meter should indicate 28 ± 1 vdc. _____ vdc	*	*				
Set "Power Supply" switch to "Meter Input Volts;" meter should indicate a nominal car battery voltage approximately 37 vdc. _____ vdc	*	*				
4.2.6 Rotate "Power Supply Input Voltage Check" control CCW until meter reads 30 ± 1 vdc. _____ vdc	*	*				
Set "Power Supply" switch to "Meter Outputs Volts" position. Meter should read 28 ± 1 vdc. _____ vdc	*	*				
Rotate "Power Supply Input Voltage Check" control fully clockwise.	*	*				
4.3 **Overspeed Test Proceedure**						
Note: The ATP system overspeed points should be checked in accordance with the setting of the wheel wear compensation switch.	*	*				
4.3.1 At test set, set "Speed Command/Berth Generator" control to 15 (15 mph)	*	*				
4.3.2 Rotate "Speed Signal Generator" control full CCW. Set "Zero Speed" switch off, and set "P/PTL" and "MC" switches to power. At console, set "MCL" in power position.	*	*				
4.3.3 Slowly advance "Speed Signal Generator" control CW until overspeed occurs. This is indicated when the overspeed indicator light is lit and sonalert sounds. Silence the sonalert by setting the "MCL" and "PBTL" to brake position.	*	*				
4.3.4 Note the reading on the frequency counter. The frequency should be within the limits shown in the "Wheel Wear Switch Positions vs Frequency in Hz for System Overspeed Checks" Table for the 15 mph setting.	*	*				
4.3.5 Using the "Speed Command/Berth Generator" control, advance through the remaining five speed command settings, repeating steps 4.3.1 thru 4.3.4 for each setting.	*	*				
4.3.6 Zero speed switch to "ON" position.	*	*				
4.3.6 Rotate "Speed Command Berth Generator" switch to "Berth R" position. The following indicators should be lit: a. Both speed mph 0	*	*				
b. Berth right	*	*				
c. EB relay energized	*	*				

PAIR NO.	DATE

	B 45	C 180	CAR A	CAR B	INIT A	INIT B
d. VZ relay energized	*	*				
e. Service brake	*	*				
f. MC IN brake	*	*				
g. Code Rate	*	*				
h. Over Speed	*	*				
4.3.7 Rotate "Speed Command Berth Generator" switch to "Berth L" position; berth left indicator should be lit along with all indicators in step 4.3.6, except "Berth Right."	*	*				
4.3.8 Set "Speed Command Berth Generator" switch to 0; MC, overspeed, service brake, EB and VZ indicators should be lit.	*	*				
Note: Code rate light on test set could be on or off.						
4.3.9 Set "MSS" on train operator's control console and test set to yard position. Set "Speed Command Berth Generator" switch to 28. Set "Speed Signal Generator" control for 2748 Hz on digital counter. Turn "Zero Speed" switch to off. The following indicators should be lit:	*	*				
a. Code Rate flashing	*	*				
b. Over Speed	*	*				
c. Service Brake	*	*				
d. Both speed mph 28	*	*				
e. MC IN Brake	*	*				
f. Yard mode	*	*				
EB and VZ relay energized indicators should be out.	*	*				
4.3.10 Set "Zero Speed" switch to on, control console "MSS" to manual mode, "Speed Signal Generator" control CCW to 1074 Hz and "Yard Mode" switch to off.	*	*				
4.3.11 Set lead car select switch to off position and set "Speed Command Berth Generator" switch to 0, service brake and both speed mph "0", EB, VZ, MC, and over speed indicators should be lit, as well as code rate on or off. At control console, set "MSS" to off and "Key" switch to lock. Only service brake and speed mph "0" indicator should be lit for auto speed regulation equipment.	*	*				
4.3.12 Set lead car select switch to "A" car position. The following indicators should be lit.	*	*				
a. VZ	*	*				

PAIR NO.	DATE

	B 45	C 180	CAR A	CAR B	INIT A	INIT B
b. Code Rate (on or off) and Service Brake	*	*				
c. MC IN Brake, Over Speed and both Speed mph "0"	*	*				
4.3.13 Return lead car select switch to "B" car position. On control console, set "Key" switch to unlock, "On/Off" switch to on position and "MSS" to manual. The following indicators should be lit: a. EB and VZ	*	*				
b. Code Rate (on or off) and Service Brake	*	*				
c. MC IN Brake, Over Speed and both Speed mph "0"	*	*				
4.3.14 Set "Speed Command Generator" switch to "A" car position and "Speed Command Berth Generator" switch to position 28. The following indicators should be lit: a. EB and BZ relay energized	*	*				
b. Code Rate (flashing) and Service Brake	*	*				
c. MC IN brake, Over Speed and both Speed mph "0"	*	*				
4.3.15 Return "Speed Command Generator" switch to "B" car position and "Zero Speed" switch to off. Overspeed and Service Brake indicators should go out and both Speed mph 28 indicators should be lit along with EB and MC, Code Rate should be flashing.	*	*				
4.3.16 Check that "Speed Signal Generator" control is set at approximately 1074 Hz on digital counter. Set "Deadman" switch to open position. EB relay energized indicator should go out in approximately 3 seconds.	*	*				
4.3.17 Disconnect the ATP Test Set and reconnect the ATP shorting plug. Replace cover panel on ATP rack.	*	*				
MAINLINE TESTING SECTION						
5.0 CAB SIGNAL SENSITIVITY ADJUSTMENT						
Note: Cab signal sensitivity is done by adjusting potentiometer R-13 on the receiver PCB for a minimum rail current of 200ma.		*				
5.1 Adjust the cab signal sensitivity as indicated in the ATP Carbourne Equipment PM Procedure #1, "Cab Signal Sensitivity Adjustment."		*				
6.0 EMERGENCY BRAKE TIMING CHECK (Ref. 5.9.4.1) (Static Test)						
6.1 To determine if the EB relay time delay period requires adjustment, perform the emergency brake timing check procedure as indicated in ATP Carbourne Equipment Service Manual #6270.		*				

PAIR NO.	DATE

	B 45	C 180	CAR A	CAR B	INIT A	INIT B
6.2 The EB relay should deenergize within the specified limit of 2.7 to 3.0 seconds. For optimum train braking/stopping distance, it cannot be allowed to increase beyond 3 seconds.		*				
_____ seconds		*				
7.0 **EB RELAY TIMING ADJUSTMENT (Ref. 5.9.4.2)**						
7.1 If the EB relay does not deenergize within the specified limit of 2.7 to 3.0 seconds, the EB relay brake assurance timing must be adjusted as indicated in ATP Carbourne Equipment Service Manual.		*				
8.0 **OVERSPEED DETECTION AND BRAKE ASSURANCE TEST (Dynamic Test) (Ref. 3.2.4.3)**						
Note: This test must be performed at a minimum train speed of 38 mph or greater on level tangent (straight) track.						
Caution: If any adjustment is made, it must be noted on the discrepancy sheet.						
8.1 Check the desired brake assurance deceleration rate; it should be a nominal 1.5 mph/second ± 0.1. If it is not, the dual decelerometer should be adjusted as indicated in the ATP Carbourne Equipment Service Manual #6270, Ref. 5.9.3.		*				
8.2 With the "Mode Sheet" switch in the yard position, move the train just outside of a station platform and increase the speed of the train to approximately 18 mph while moving through the station platform. When the overspeed alarm sounds, move the control console "MCL" to the service brake position.		*				
EXPECTED RESULTS						
8.2.1 When the overspeed point is reached, the overspeed alarm will sound (Sonalert) and the overspeed indication on the operator's console will illuminate. _____ yes _____ no		*				
8.2.2 When the control "MCL" is moved to a service brake position, the overspeed alarm will silence, but the console overspeed indication will remain illuminated until the train speed is below the yard speed, whereupon the US relay will energize. _____ yes _____ no		*				
8.2.3 In the event the BA (Brake Assurance) relay does not energize by 2.5 to 3.0 seconds, the EB relay will deenergize, resulting in an irrecoverable emergency stop. The BA relay should be energized when braking effort attains 1.5 mph/sec and above. _____ yes _____ no		*				
8.3 Repeat steps 8.2 thru 8.2.3 from the "A " car end.		*				
8.4 Repeat step 8.2, but do not move the "MCL" to service brake (keep handle in power).		*				

PAIR NO.	DATE

	B 45	C 180	CAR A	CAR B	INIT A	INIT B
8.4.1 The overspeed light and the alarm will remain on, and the train will come to a stop at a service brake rate (3.0 mph/s). The US relay will not energize. Place the "MCL" in a service position to energize the US relay and silence the alarm.		*				

DISCREPANCIES:

Tech Signature/Date (B)

Sup. Signature/Date

Tech Signature/Date (C)

Sup. Signature/Date

US&S MANUAL 6270

Wheel Wear Switch Positions vs. Frequency in Hz
For System Overspeed Checks

HZ/MPH	68.7	69.29	70.05	70.56	71.35	71.88	72.69	73.25	74.09	74.61
WHEEL DIA.	27.8	27.5	27.3	27.0	26.8	26.5	26.3	26.0	25.8	25.5
WHEEL WEAR SWITCH POS.	1	2	3	4	5	6	7	8	9	10
HIGH	1082.0	1091.3	1103.3	1111.3	1123.8	1132.1	1144.9	1153.7	1166.9	1176.0
15										
LOW	1054.2	1063.3	1074.9	1082.8	1094.8	1103	1115.4	1124.1	1136.9	1145.8
HIGH	1978.5	1995.5	2017.4	2032.1	2054.9	2070.1	2093.5	2109.6	2133.8	2150.5
28										
LOW	1938.4	1955.1	1976.4	1990.9	2013.2	2028.1	2050.9	2066.7	2090.5	2106.8
HIGH	2672.4	2695.3	2724.9	2744.8	2775.3	2796.1	2827.6	2849.4	2882.1	2904.7
38										
LOW	2618.6	2641.2	2669.9	2689.4	2719.9	2739.7	2770.5	2791.9	2824	2846.1
HIGH	3229	3255.6	3292.3	3316.3	3353.5	3378.4	3416.4	3442.8	3482.2	3509.5
46										
LOW	3162.6	3189.7	3224.7	3248.2	3284.6	3309	3346.2	3372	3410.7	3437.5
HIGH	4053.3	4088.1	4132.9	4163	4209.7	4240.9	4288.7	4321.8	4371.3	4405.5
53										
LOW	3971.9	4006	4050	4079.5	4125.1	4155.8	4202.6	4235	4283.6	4316.5
HIGH	4877.7	4919.6	4973.5	5009.8	5065.9	5103.5	5161	5200.8	5260.4	5301.6
70										
LOW	4781.3	4822.3	4875.3	4910.8	4965.8	5002.7	5059	5098	5156.5	5196.8

NOTE: Overspeed Point must fall within the above high and low ranges.

MIAMI-DADE TRANSIT
METRORAIL
DEFECTIVE ITEMS FROM SCHEDULED INSPECTIONS

CAR NO:_____ **DATE:_____**

ITEM NO.	REPORTED BY	DESCRIPTION OF DEFECTS	ACTION TAKEN	BADGE # OR SIGNATURE

CAR NO:_____ **DATE:_____**

ITEM NO.	REPORTED BY	DESCRIPTION OF DEFECTS	ACTION TAKEN	BADGE # OR SIGNATURE

APPENDIX D

Sample Pre-Operational "S" Inspection of Stored Cars

R/O # _____

MIAMI-DADE TRANSIT
METRORAIL
PRE-OPERATION "S" INSPECTION OF STORED CARS

Vehicle Pair	Target Time	Actual Time	Due Date	Date Completed

Hour Meter	Hubodometer /	Supervisor

JOB TIME

Employee	Classification	Employee No.	Date	Hours

ITEM	TASK DESCRIPTION	INITIAL Car A	INITIAL Car B
1.	Perform ATP B Inspection – Performance Check Procedure.	____	____
2.	Check condition of ATP and PSS antennas.	____	____
3.	Check operation of ATP bypass alarm.	____	____
4.	Propulsion Logic – Visually inspect that hexidecimal LED display is functioning.	____	____
5.	Cycle doors.	____	____
6.	Check that HVAC and evaporator units are operable.	____	____
7.	Check operation of horn.	____	____
8.	Check windshield wiper.	____	____
9.	Service brake pressure check.	____	____
10.	Emergency brake pressure check.	____	____
11.	Clean coupler pins and adjust if necessary.	____	____
12.	Check all air compressor components.	____	____
13.	Check propulsion blower operation.	____	____
14.	Car B BATTERY – Check electrolyte level for all cells. If level is below maximum level, fill deficient cells with distilled water only. Check connections and ensure that connector covers are properly installed. Check condition of battery box, including damage which may affect ventilation. Check box hardware to verify its integrity.		____

MIAMI-DADE TRANSIT
METRORAIL
DEFECTIVE ITEMS FROM SCHEDULED INSPECTIONS

CAR NO:_____ **DATE:_____**

ITEM NO.	REPORTED BY	DESCRIPTION OF DEFECTS	ACTION TAKEN	BADGE # OR SIGNATURE

CAR NO:_____ **DATE:_____**

ITEM NO.	REPORTED BY	DESCRIPTION OF DEFECTS	ACTION TAKEN	BADGE # OR SIGNATURE

APPENDIX E

List of Components Replaced during "F" and "G" Inspections

MAIMI-DADE TRANSIT
METRORAIL
RAIL VEHICLE MAINTENANCE
"F" AND "G" INSPECTION
ELECTRICAL

PAIR NO.	DATE					
ITEM	TASK DESCRIPTION	REF	F	G	A CAR	B CAR
Propulsion		4.8.0				
1.0	R&R all battery cells with new cells.		*	*		
1.1	Check individual cell voltages.		*	*		
1.2	Coat terminals with Nife-Coat.		*	*		
1.3	Wash battery compartment box with water hose.		*	*		
	Note: Seal all magnet valve parts with duct tape, Tag, and place in sorting area.					
	MOTOR CONTROL BOX					
1.4	Air Cylinder/Mag valve assy.					
1.5	Check each connection for looseness, overheating or burnt cables.					
1.6	R&R electro/pneumatic assemblies transfer to shop for overhaul (Air Cylinder/mag valve assy).		*	*		
1.7	R&R reverser for overhaul. Perform Test.	4.2.1	*	*		
1.8	Retorque all high voltage connections on the brake contactor (uma34b, umd125c).		*	*		
1.9	Wipe down and vacuum the line switch box.		*	*		
1.10	Replace filter element in the air regulator bowl.		*	*		
1.11	Perform operational check on the PAR. Increase input air pressure until switch closes – must occur above 65 psi. Decrease input air pressure until switch opens – must occur below 54 psi. Replace if necessary.		*	*		
1.12	R&R line switch for overhaul.		*	*		
1.13	Check line switch mounting bolts, connections, and air leaks.		*	*		
1.14	Check line switch magnet valves for leaks in the energized and deenergized positions.		*	*		
1.15	Inspect interlocks (1/8" gap).		*	*		

MAIMI-DADE TRANSIT
METRORAIL
RAIL VEHICLE MAINTENANCE
"F" AND "G" INSPECTION
ELECTRICAL

PAIR NO.	DATE					
ITEM	TASK DESCRIPTION	REF	F	G	A CAR	B CAR
1.16	Inspect line switch shunts.		*	*		
1.17	Retorque all connections to specs.		*	*		
1.18	Remove all heat sink modules in the semiconductor box, and clean the box. Stamp Serial No. on each unit.		*	*		
1.19	Clean and gate thyristor units.		*	*		
1.20	Retorque high voltage connections.		*	*		
<u>Electric Coupler</u>						
2.0	Purge water from air supply line.			*		
2.1	Replace filter element.		*	*		
2.2	Remove and replace coupler control valves.		*	*		
<u>Door System</u>						
1.0	Lubricate door motor/gear housing assembly.		*	*		

MIAMI-DADE TRANSIT
METRORAIL
TRANSIT CAR "F" OR "G" INSPECTION
MECHANICAL

Vehicle Pair	Target Time	Actual Time	Due Date	Date Completed
Hour Meter /		Hubodometer /		Supervisor

JOB TIME

Employee	Classification	Employee No.	Date	Hours

QUALITY VERIFICATION OF PM TASKS

Task Inspected	

Inspected By: _____
Supervisor Signature

_____
Date

MIAMI-DADE TRANSIT
METRORAIL
RAIL VEHICLE MAINTENANCE
"F" AND "G" INSPECTION
MECHANICAL

PAIR NO.	DATE					
ITEM	TASK DESCRIPTION	REF	F	G	A CAR	B CAR
COUPLERS AND DRAFT GEAR						
1.0	Remove and replace poppet valve Assy.	7.2.6.31	*	*		
Mechanical Coupler						
2.0	Remove and replace mechanical coupler.	7.2.1.2		*		
2.1	Perform operational test.			*		
2.2	Inspect air line seals and replace as necessary.		*	*		
2.3	Remove and replace coupler air line seals.		*	*		
2.4	Lubricate Manual release shaft, hook, guide pins (Alvania #2 grease).	7.2.1.0		*		
2.5	Check for correct hook operation.			*		
Electric Coupler		7.2.2.2				
3.0	Remove and replace electrical coupler.			*		
3.1	Perform operational test.			*		
Draft Gear Assembly						
4.0	Remove and replace draft gear assembly.	7.2.10		*		
4.1	Lubricate yoke assy, yoke pin and anchor pin, with Alvania #2 grease.			*		
4.2	Replace shear bolts.			*		
4.3	Shim draft gear.			*		
Gear Unit						
5.0	Remove trucks, remove axles, and replace gear units (by replacing trucks and/or Axles).			*		
5.1	Refill with 80W90 gear oil.			*		
5.2	Lubricate coupler with WELCO M5523AX grease. NOTE: Complete component repair forms for Axle Assembly work.			*		

MIAMI-DADE TRANSIT
METRORAIL
RAIL VEHICLE MAINTENANCE
"F" AND "G" INSPECTION
MECHANICAL

PAIR NO.	DATE					
ITEM	TASK DESCRIPTION	REF	F	G	A CAR	B CAR
<u>Propulsion Blower</u>						
6.0	Remove and replace motor with an overhauled unit.	4.8.0	*	*		
6.1	Ensure blower wheel is clean.		*	*		
6.2	Check for excessive vibration after installation.		*	*		
<u>Trucks and Suspension</u>						
7.0	Replace all eight shock absorbers on each car and check hardware.	3.0	*	*		
7.1	Hubodometer reading.		*	*		
7.2	Replace ATP antenna rubber bushings.		*	*		
7.3	Replace radius rod rubber bushing.		*	*		
<u>Friction Brakes</u>		6.3,6.4				
	Note: Seal all valves removed with duct tape and tag and place in sorting area. Record all serial numbers in and out.					
8.0	R&R parking brake units, transfer to shop for overhaul.		*	*		
8.1	R&R N-1 valve assembly, transfer to shop for overhaul.		*	*		
8.2	R&R tread brake actuator(s), transfer to shop for overhaul.		*	*		
8.3	R&R S-1 servotrol unit, transfer to shop for overhaul.		*	*		
8.4	R&R J-1 relay valve, transfer to shop for overhaul.		*	*		
8.5	R&R H-7 valve(s) portion of J-3-A servotol unit, transfer to shop for overhaul.		*	*		
8.6	R7R N-3-E magnet valve, transfer to shop for overhaul.		*	*		
8.7	R&R N-3-D magnet valve, transfer to shop for overhaul.		*	*		

MIAMI-DADE TRANSIT
METRORAIL
RAIL VEHICLE MAINTENANCE
"F" AND "G" INSPECTION
MECHANICAL

PAIR NO.	DATE					
ITEM	TASK DESCRIPTION	REF	F	G	A CAR	B CAR
<u>Friction Brakes</u> (Con't)		6.3.6.4				
8.8	R&R N-5-D magnet valve, transfer to shop for overhaul.		*	*		
8.9	R&R 24-D double check valve(s), emergency unit, transfer to shop for overhaul.		*	*		
8.10	R&R variable load valve(s), transfer to shop for overhaul.		*	*		
8.11	R&R N-6-D valve(s), for overhaul.		*	*		
8.12	R&R check valve portion of A-1 emergency unit for overhaul.		*	*		
8.13	R&R No. #8 vent valve for overhaul.		*	*		
8.14	R&R D-1 pilot air valve for overhaul.		*	*		
8.15	R&R D-4-S for overhaul.		*	*		
8.16	R&R air compressor assembly (including F-2 safety valve) for overhaul.		*	*		
8.17	Set safety valve pressures.		*	*		
8.18	R&R emergency reservoir for hydrostatic testing.		*	*		
8.19	Replace brake shoes if ¾" or less.		*	*		
8.20	Set emergency brake pressure.		*	*		
8.21	Set service brake pressure (38-40 psi).		*	*		
8.22	Inspect charging and maintaining brake pressure.		*	*		
8.23	Inspect for proper brake pipe reduction.		*	*		
8.24	Perform functional check of D-1 pilot air valve.		*	*		

MIAMI-DADE TRANSIT
METRORAIL
PARTS NO. RECORD FOR "F" AND "G" INSPECTIONS

CAR NO: _____

F OR G INSPECTION DATE: FROM_____
TO_____
RO #_____

SUB ASSY:	PART DESCRIPTION	LOC. ON CAR	REF PM TASK LIST DIF. NO:	FUNCTION CODE:	SERIAL NOS: OUT	SERIAL NOS: IN	R&R BY:	EMP NO.	REMARKS
TRUCK ASSY	TRUCKS	1							
		2		010701					
	AXLES	1							
		2		010703					
		3							
		4							
SEMI-BOX HEATSINK MODULES	TIA/DIA	A	0405006000	010605					
	TIB/DIB	B	0405006000	010605					
	TIC/DIC	C	0405006000	010605					
	TID/DID	D	0405006000	010605					
	T2A/D2A	A	0405010000	010605					
	T2B/D2B	B	0405010000	010605					
	T5A/D5A	A	0405006000	010605					

MIAMI-DADE TRANSIT
METRORAIL
PARTS NO. RECORD FOR "F" AND "G" INSPECTIONS

CAR NO: _____

F OR G INSPECTION DATE: FROM_____
TO_____
RO #_____

SUB ASSY:	PART DESCRIPTION	LOC. ON CAR	REF PM TASK LIST DIF. NO:	FUNCTION CODE:	SERIAL NOS: OUT	SERIAL NOS: IN	R&R BY:	EMP NO.	REMARKS
SEMI-BOX HEATSINK MODULES (Con't)	T5B/D5B	B	040500600	010605					
	T6/D6	N/A	0405010000	010605					
	D3/D7	N/A	0405008000	010605					
	FWD	N/A	0405012000	010605					
MOTOR CONTROL BOX	PB RELAY	MCB 1.8	0402055011	010605					
	Air Cyl - LC	MCB 1.8	0402055011	010603					
	Air Cyl - PBC	MCB 1.8	0402046000	010603					
	Air Cyl - PC	MCB 1.8	0402031004	010603					
	Pinston Assy	MCB 1.8	0402003003	010603					
	Mag Valve-PBC Top	MCB 1.8	0402045007	010603					
	Mag Valve-PBC Bot	MCB 1.8	0402045006	010603					

MIAMI-DADE TRANSIT
METRORAIL
PARTS NO. RECORD FOR "F" AND "G" INSPECTIONS

CAR NO: _____

F OR G INSPECTION DATE: FROM_____
TO_____
RO #_____

SUB ASSY:	PART DESCRIPTION	LOC. ON CAR	REF PM TASK LIST DIF. NO:	FUNCTION CODE:	SERIAL NOS: OUT	SERIAL NOS: IN	R&R BY:	EMP NO.	REMARKS
MOTOR CONTROL BOX	Mag Valve - LC	MCB	0402003003	010603					
	Reverser Assy	MCB	0402007000	010603					
	Air Cylinder/	MCB	0402007000	010603					
	Mag Valve	MCB	0402025003	010603					
	Assy - FC								
LS BOX	LS1 Assy	LSB	0404001001	010604					
	LS2 Assy 1-14	LSB	0404003000	010604					
FRICTION BRAKE	S-1 Servotrol	SCU	0601000011	010804					
	J-1 Relay Valve	SCU	0608000000	010804					
	Mag Valve - N-3-E	SCU	0610000000	010807					
	Mag Valve - N-5-D	SCU	0612000000	010807					
	Mag Valve - N-3-D	SCU	0609000000	010807					
	Mag Valve - N-6-D	SCU	0613000009	010802					

MIAMI-DADE TRANSIT
METRORAIL
PARTS NO. RECORD FOR "F" AND "G" INSPECTIONS

CAR NO: _____

F OR G INSPECTION DATE: FROM_____
TO_____
RO #_____

SUB ASSY:	PART DESCRIPTION	LOC. ON CAR	REF PM TASK LIST DIF. NO:	FUNCTION CODE:	SERIAL NOS: OUT	SERIAL NOS: IN	R&R BY:	EMP NO.	REMARKS
FRICTION BRAKES	Mag Valve - N-6-D	F-End A-1	0613000009						
	H-7 Relay Valve	R-End A-1	0611000000	010802					
	H-7 Relay Valve	F-End A-1	0611000000	010802					
	H-7 Relay Valve	E-End Servo	0611000000	010804					
	Variable Load Valve	R-End A-1	0614000000	010802					
	Variable Load Valve	F-End A-1	0614000000	010802					
	No. 8 Vent Valve		0639000000	010802					
	24-D Check Valve	R-End A-1	0613000014	010802					
	24-D Check Valve	F-End A-1	0613000014	010802					
	D-1 Pilot Air Valve	Op. Cab	0220000003	010802					
	Prkng Brake Portion	Axle No. 1	0637000000	010809					
	Prkng Brake Portion	Axle No. 2	0637000000	010809					
	Actuator Portion	1	0633000010	010805					
	Actuator Portion	2	0633000010	010805					

MIAMI-DADE TRANSIT
METRORAIL
PARTS NO. RECORD FOR "F" AND "G" INSPECTIONS

CAR NO: _____

F OR G INSPECTION DATE: FROM_____
TO_____
RO #_____

SUB ASSY:	PART DESCRIPTION	LOC. ON CAR	REF PM TASK LIST DIF. NO:	FUNCTION CODE:	SERIAL NOS: OUT	SERIAL NOS: IN	R&R BY:	EMP NO.	REMARKS
FRICTION BRAKES (Con't)	Actuator Portion	3	0633000010	010805					
	Actuator Portion	4	0633000010	010805					
	Actuator Portion	5	0633000010	010805					
	Actuator Portion	6	0633000010	010805					
	Actuator Portion	7	0633000010	010805					
	Actuator Portion	8	0633000010	010805					
	Valve Shut-Off	A-Car F-End	0629000000	010806					
	Valve Shut-Off	B-Car F-End	062900000A	010806					
	N1 Reducing Valve		0662000041	010806					
	Air Compressor Assy	A-Car	0646000000	010806					

MIAMI-DADE TRANSIT
METRORAIL
PARTS NO. RECORD FOR "F" AND "G" INSPECTIONS

CAR NO: _____

F OR G INSPECTION DATE: FROM_____
TO_____
RO #_____

SUB ASSY:	PART DESCRIPTION	LOC. ON CAR	REF PM TASK LIST DIF. NO:	FUNCTION CODE:	SERIAL NOS: OUT	IN	R&R BY:	EMP NO.	REMARKS
PRO. BLOWER	PRO. BLOWER MOTOR	F-End	0411001005						
	MECHANICAL COUPLER		0703002000	010203					
	ELECTRICAL COUPLER			010202					
	DRAFT GEAR		0711001000						

APPENDIX F

Rail Vehicle/Mileage/Hours By Pair

September 2001

Rail Vehicle Mileage & Hours
By Married Pair

September 2001

Married	Cumulative		Current		Married	Cumulative		Current	
Pair	Hours	Miles	Pair	Miles	Pair	Hours	Miles	Hours	Miles
101-102	25,706	639,000	0	0	169-170	27,505	721,700	251	5,700
103-104	20,329	500,800	220	5,500	171-172	16,345	419,900	257	7,000
105-106	32,283	825,900	57	1,500	173-174	26,084	677,200	203	4,700
107-108	32,874	838,500	0	0	175-176	27,612	719,400	271	7,300
109-110	31,225	790,300	171	4,100	177-178	31,742	839,100	281	7,400
111-112	27,520	718,900	272	6,500	179-180	33,201	813,300	289	7,800
113-114	32,933	831,600	256	7,000	181-182	27,780	875,200	259	5,700
115-116	15,909	411,200	265	6,900	183-184	28,849	746,100	235	5,800
117-118	17,548	455,600	0	0	185-186	31,992	836,400	210	5,700
119-120	32,214	830,800	179	4,400	187-188	24,972	644,400	222	5,600
121-122	34,562	879,600	128	3,200	189-190	32,865	862,300	209	5,800
123-124	31,664	820,100	0	0	191-192	31,924	823,200	233	5,900
125-128	28,390	734,400	70	1,500	193-194	30,287	786,800	192	4,800
127-126	17,725	427,400	248	6,200	195-196	30,830	822,000	0	0
129-130	34,809	904,600	262	6,300	197-198	20,624	551,500	272	6,500
131-132	28,104	715,400	64	1,400	199-200	23,360	617,100	253	7,100
133-134	28,384	737,400	239	5,900	201-202	30,178	773,300	237	5,900
135-136	14,207	871,600	288	8,200	203-204	26,048	672,200	194	5,000
137-138	31,897	823,600	272	6,700	205-206	29,596	774,900	248	6,200
139-140	28,020	725,100	303	7,600	207-208	23,762	623,500	1	0
141-142	22,212	564,900	222	5,900	209-210	25,652	674,400	290	7,400
143-144	34,985	905,500	235	5,800	211-212	24,749	651,600	201	5,000
145-146	29,423	757,800	208	5,600	213-214	30,690	811,800	204	5,000
147-148	29,552	769,100	228	5,900	215-216	23,687	624,800	7	200
149-150	31,532	812,100	0	0	217-218	32,038	847,300	199	4,900
151-152	24,141	798,100	199	5,300	219-220	26,126	681,800	236	5,900
153-154	27,708	719,500	276	6,900	221-222	28,435	742,700	225	5,700
155-156	26,366	858,400	233	5,700	223-224	30,803	809,100	322	8,300
157-158	29,863	762,800	0	0	225-226	29,489	782,401	2	0
159-160	28,076	748,500	309	7,700	227-228	31,621	832,400	304	7,800
161-162	27,940	722,400	253	6,300	229-230	30,391	808,000	253	6,200
163-164	26,307	699,500	211	4,500	231-232	30,571	825,200	246	6,100
165-166	27,495	878,500	193	4,700	233-234	27,948	741,800	258	7,200
167-168	13,421	670,100	180	4,600	235-236	29,302	762,500	231	5,700
Total	1,882,382	50,344,301	13,336	337,100	Average	27,682	740,357	196	4,957

APPENDIX G

Sample Rail Operations

Maintenance Program Policy

MIAMI-DADE TRANSIT
METRORAIL AND METROMOVER
MAINTENANCE PROGRAM POLICY

Effective Date: March 27, 1996

Revision Date: June 1, 2000
Revision Number: B

I. CONTENT:

II. POLICY

1.0 Maintenance Program Philosophy/Goal:

- Maximize cost effectiveness of maintenance efforts consistent with safe operations through a proper balance of preventive maintenance, corrective maintenance and hardware/software improvement.

2.0 Purpose of Maintenance Program:

- To maintain the designed safety and reliability levels of the equipment.

- The Maintenance Program recognizes that maintenance cannot correct deficiencies in the designed safety and reliability levels of equipment. At best, the maintenance program can only prevent deterioration from the design levels. If those inherent levels are found to be unsatisfactory in service, design modification is necessary to obtain improvement.

3.0 Maintenance Program Objectives:

- To ensure realization of design safety and reliability levels of equipment.

- To restore safety and reliability to their inherent levels when deterioration has occurred.

- To obtain the information needed to improve design of item whose inherent reliability proves inadequate.

- To accomplish these objectives at minimum total cost, including maintenance costs and the costs of residual failures.

4.0 Types of Maintenance:

- Planned/Scheduled Maintenance:
  - PMs and Modifications

- Nonscheduled Maintenance:
  - Correction of discrepancies found during PMs, modifications, other unscheduled maintenance, normal operations or data analysis.

- Planned, Non Scheduled Maintenance:
  - At times, discrepancies found during PMs, modifications, or other unscheduled maintenance, normal operations or data analysis, can be deferred and a shop visit planned and scheduled for a later time to correct the discrepancy. Discrepancies affecting safety or operational reliability cannot be deferred.

5.0 Maintenance Program Accomplishment:

- Scheduled Tasks-Modifications:
  - Accomplished in accordance with plan.
  - Objective: to improve safety, reliability or maintainability.
- Scheduled Tasks – PM inspections:
  - Accomplished at specified intervals.
  - Objective: to prevent deterioration of equipment from designed safety and reliability levels.
  - Types of Tasks:
    - Lube/Servicing
    - Operations/Visual Check
    - Inspection/Functional Check
    - Condition Testing and Recording
    - Restoration
    - Discard
- Nonscheduled Tasks:
  - Accomplished as required.
  - Generated from:
    - Scheduled Tasks
    - Malfunction Reports
    - Data Analysis
  - Objective: restore equipment to acceptable safety and reliability levels.

6.0 Maintenance Program Efficiency:

- Schedules only those tasks necessary to meet stated objectives.
- Does not schedule tasks that will increase maintenance costs without a corresponding increase in reliability or safety.

7.0 Scheduled Maintenance Application:

- Track System scheduled maintenance program will be such that the trackwork system meets or exceeds standards specified in the MIAMI-DADE TRANSIT RAIL OPERATIONS (DIVISION) STANDARD OPERATING PROCEDURES, P.M. GP-03 (Safety Standards for Inspection and Maintenance of Track).

- All fixed, mobile and transportable equipment used in the delivery and maintenance of MDTA Rail and People Mover (Automated Guideway) transit service will have periodic preventive maintenance inspections and servicing.

- PM Inspections and servicing will consist of routine tasks as described above under Program Content, Scheduled Tasks.

- Campaign Inspections are short term inspections of specific hardware items for the purpose of assessing status or condition. Such inspections can be initiated by the maintenance engineer, maintenance supervision of management or Rail Maintenance Control. Such inspections are temporary in nature and are not considered as part of the approved PM program. Campaign inspections, while independent of the PM program, may be ordered and scheduled in conjunction with routine approved PM inspections as a matter of expediency.

8.0 Scheduled Inspection/Tasks Specifications:

- Specifications for PM performance will be derived from manufacturer's recommendations as modified by experience and engineering analyses of the hardware and its use.

- PM performance specifications will include specific tasks, procedures, methods, tools and test equipment where appropriate, frequency of performance, dimensions/tolerances, rates, distances, clearances, quantities, viscosities, and other such standards as appropriate.

9.0 Deviation from Maintenance Program Specifications:

- No deviations from any approved PM task, procedure, method, frequency or other specification that exists to insure public/employee safety are permitted.

- Deviations from approved PM tasks, procedures, method, frequency or other specifications that exist solely for reliability, maintainability or other economic reasons, may be authorized by written approval of the Assistant Director, Transit Services or higher authority. Such deviations from the approved PM program will be authorized only under extreme circumstances.

10.0 Maintenance Program Records:

- Records required by Federal, State and local agencies and other as necessary to verify scheduling and accomplishment of the approved PM program inspections shall be maintained in good order and accessibility.

- Such records as necessary to support warranty and other claims and analyses for economic reliability, maintainability, performance, quality control and PM program revision purposes shall also be maintained in good order and accessibility.

11.0 Maintenance Program Revisions:

- Program Continuously Examined.

  In addition to revisions resulting from hardware systems changes, the maintenance program is continuously examined for potential improvements based on reliability/maintainability historical experience.

- Initiation of Revision.

  Program changes can be identified and recommended by numerous sources; for example, the County's Employee Suggestion Program, Supervisory Staff, Rail Maintenance Control and others.

  The actual change is initiated by a memo of recommendation with supporting justification from the maintenance engineer in whose area of responsibility the program procedures fall. In general the changes add or delete tasks from a routine inspection bill of work or increase/decrease an inspection frequency. Specification changes and methods changes are also included.

- Approval of Revision.

  A copy of the affected procedure is modified by Maintenance Control per the engineer's recommendation and circulated, along with the justification and supporting documentation, for review and approval/disapproval by all affected Division Chiefs, Office of Safety and Security and the Assistant Director.

  If the change is approved by consensus, it becomes effective as soon as all appropriate paperwork is revised and issued. If disapproved, the recommended change is returned to the initiating engineer with reasons for disapproval. The engineer then may take appropriate action to allay objections or drop the case, depending on the situation.

- Increases to Maintenance.

  Additions to the program and changes that increase the intensity of maintenance may not go through the entire approval process; recommended additions to the maintenance program, if approved by the maintenance section that must accomplish the additional maintenance, are then reviewed by Maintenance Control. If there will be no scheduling problems, no further approvals are necessary. Otherwise, the recommended change enters the normal approval process. Changes of this type usually originate with the maintenance department involved who notify the appropriate engineer of their need. The engineer then prepares the recommended change and initiates the process illustrated in the attached flow chart.

- Additions in the form of newly created preventive maintenance procedures will be treated the same as revisions resulting in a decrease in intensity of maintenance (see Section 11.0, paragraphs 2 and 3).

12.0 Maintenance Program Revisions Justification:

- Approval Process.

  A good preventive maintenance program is constantly under scrutiny for its cost-effectiveness, and as a result, there will be frequent revisions to improve procedures.

Revisions that delete tasks, increase inspection intervals or otherwise reduce the intensity of maintenance are subject to an approval process that requires sign off by Rail Maintenance Control, the division head responsible for accomplishment of the PM, Office of Safety and Security, and any division head whose area of responsibility may be affected, as well as the Assistant Director.

- Maintenance Engineering Required.

  The procedure improvement can be proposed by anyone; however, the written PM procedure revision must be recommended in writing by the appropriate maintenance engineer. The engineer must describe in a memo that will accompany the revised procedure through the approval/sign off process, the reasoning and justification for the proposed revision.

- Justification.

  The Maintenance Engineer's memo must address, as a minimum, the following concerns of those who must provide their approval or disapproval of the revision:

  - The purpose of the revision, why it is proposed.

  - What are the changes being recommended? Are tasks being added, deleted, modified, simplified, etc., are specs being changed, methods changed, test equipment changed; etc.

  - What effect will the change have on the following:

    - Safety?
    - Reliability?
    - Maintainability?
    - Operations/System Performance?
    - Costs?

  - A description of the analysis that supports the recommendation to revise the procedure. The analysis may be a detailed study of the results of previous accomplishments of the procedure, an analysis of failure data, or it may be an industry survey, or a vendor's recommendation, or even a logical rationale, in the absence of all other hard data.

The engineer's memo is to be complete enough that the revision will pass through the approval route without generating questions or objections from those who must sign their approval.

13.0 Conditional Maintenance Program Revisions:

- The approval process for revisions to the program may impose conditions on the revision.

  - There may be occasions when a test period with appropriate data collection and analysis to establish the efficacy of the change may be required by one or more of those individuals who must approve the change.

- Maintenance Engineering specifies criteria for a successful test.

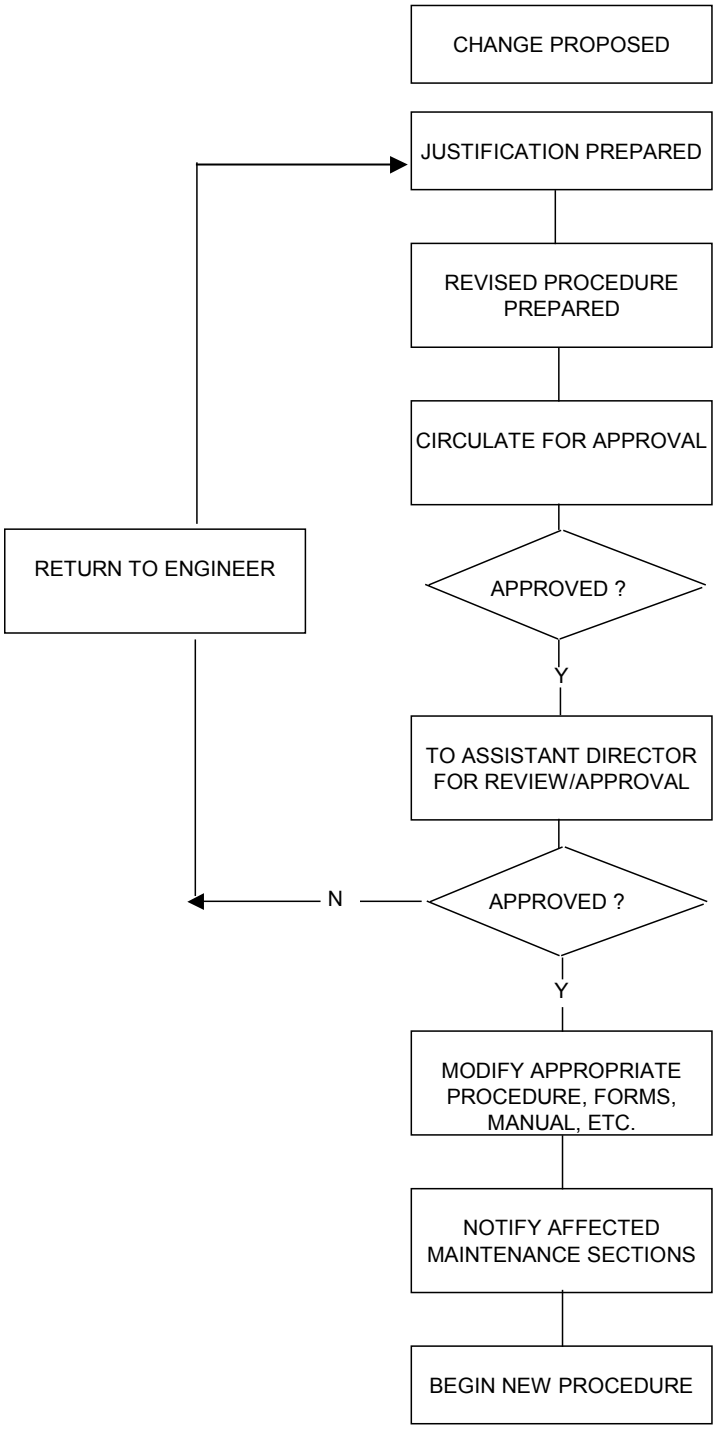
  - The engineer specifies length of test, data collection and analysis requirements and defines a successful outcome of the test and resubmits the recommendation for approval.

- Conclusion of test.

  - If successful, a report summarizing the results will be prepared and circulated with the revised PM procedure for final approval.

  - If unsuccessful, the original procedure is restored and the concerned parties are notified of the action.

MAINTENANCE PROGRAM
REVISIONS FLOW CHART



MINIMUM: 3 APPROVALS REQUIRED FOR NEW OR REDUCED MAINTENANCE PROCEDURES
2 APPROVALS FOR ADDITIONS TO MAINTENANCE

APPENDIX H

Rail Modernization Cycles

Miami-Dade Transit
Rail Modernization Cycles

MDT's preliminary proposal for the midlife modernization program proposes the program will be completed in 272 weeks at a rate of 2 cars (1 married pair) per month. Based on current estimates, several sample modernization cycles were run to determine time frames for modernization of the entire fleet based on varying modernization cycles.

Sample cycles illustrated on Pages 1-6 include:

- 10-Week Cycle, 328-Week Schedule
- 10-Week Cycle, 272-Week Schedule
- 12-Week Cycle, 460-Week Schedule
- 12-Week Cycle, 272-Week Schedule
- 14-Week Cycle, 606-Week Schedule
- 14-Week Cycle, 272-Week Schedule

Each cycle is color-coded as follows:

Phase A	Vehicle Prep and Transport to Site
Phase B	Vehicle Modernization
Phase C	Vehicle Transport to MDT
Phase D	MDT Acceptance Testing

Each cell of the schedule represents a total of 2 weeks.

Week	2	4	6	8	10	12	14	…	…	52

Miami-Dade Transit

Rail Modernization

10-Week Cycle, 328 Week Schedule

Week	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
Prep	1																									
Rehab		1																								
Return																									1	
Accept																										1
Available	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Week	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104
Prep	2		3		4		5		6		7		8		9		10		11		12		13		14	
Rehab		2		3		4		5		6		7		8		9		10		11		12		13		14
Return				2		3		4		5		6		7		8		9		10		11		12		13
Accept					2		3		4		5		6		7		8		9		10		11		12	
Available	67	67	66	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66
Week	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138	140	142	144	146	148	150	152	154	156
Prep	15		16		17		18		19		20		21		22		23		24		25		26		27	
Rehab	14	15		16		17		18		19		20		21		22		23		24		25		26		27
Return		14		15		16		17		18		19		20		21		22		23		24		25		26
Accept	13		14		15		16		17		18		19		20		21		22		23		24		25	
Available	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	6	65	66
Week	158	160	162	164	166	168	170	172	174	176	178	180	182	184	186	188	190	192	194	196	198	200	202	204	206	208
Prep	28		29		30		31		32		33		34		35		36		37		38		39		40	
Rehab	27	28		29		30		31		32		33		34		35		36		37		38		39		40
Return		27		28		29		30		31		32		33		34		35		36		37		38		39
Accept	26		27		28		29		30		31		32		33		34		35		36		37		38	
Available	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66
Week	210	212	214	216	218	220	222	224	226	228	230	232	234	236	238	240	242	244	246	248	250	252	254	256	258	260
Prep	41		42		43		44		45		46		47		48		49		50		51		52		53	
Rehab	40	41		42		43		44		45		46		47		48		49		50		51		52		53
Return		40		41		42		43		44		45		46		47		48		49		50		51		52
Accept	39		40		41		42		43		44		45		46		47		48		49		50		51	
Available	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66
Week	262	264	266	268	270	272	274	276	278	280	282	284	286	288	290	292	294	296	298	300	302	304	306	308	310	312
Prep	54		55		56		57		58		59		60		61		62		63		64		65		66	
Rehab	53	54		55		56		57		58		59		60		61		62		63		64		65		66
Return		53		54		55		56		57		58		59		60		61		62		63		64		65
Accept	52		53		54		55		56		57		58		59		60		61		62		63		64	
Available	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66
Week	314	316	318	320	322	324	326	328																		
Prep	67		68																							
Rehab	66	67		68																						
Return		66		67		68																				
Accept	65		66		67		68																			
Available	65	66	65	66	66	67	67																			

Miami-Dade Transit

Rail Modernization

10-Week Cycle - 272 Week Schedule

Week	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
Prep	1																									
Rehab		1																								
Return																									1	
Accept																										1
Available	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Week	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104
Prep	2		3		4		5		6		7		8		9		10		11		12		13		14	
Rehab		2		3		4		5		6		7		8		9		10		11		12		13		14
Return				2		3		4		5		6		7		8		9		10		11		12		13
Accept					2		3		4		5		6		7		8		9		10		11		12	
Available	67	66	66	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66
Week	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138	140	142	144	146	148	150	152	154	156
Prep	15		16		17		18		19		20		21		22		23		24		25		26		27	
Rehab	14	15		16		17		18		19		20		21		22		23		24		25		26		27
Return		14		15		16		17		18		19		20		21		22		23		24		25		26
Accept	13		14		15		16		17		18		19		20		21		22		23		24		25	
Available	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66
Week	158	160	162	164	166	168	170	172	174	176	178	180	182	184	186	188	190	192	194	196	198	200	202	204	206	208
Prep	28		29		30		31		32		33		34		35		36		37		38		39		40	
Rehab	27	28		29		30		31		32		33		34		35		36		37		38		39		40
Return		27		28		29		30		31		32		33		34		35		36		37		38		39
Accept	26		27		28		29		30		31		32		33		34		35		36		37		38	
Available	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66
Week	210	212	214	216	218	220	222	224	226	228	230	232	234	236	238	240	242	244	246	248	250	252	254	256	258	260
Prep	41/42		43/44		45/46		47/48		49/50		51/52		53/54		55/56		57/58		59/60		61/62		63/64		65/66	
Rehab	40	41/42		43/44		45/46		47/48		49/50		51/52		53/54		55/56		57/58		59/60		61/62		63/64		65/66
Return		40		41/42		43/44		45/46		47/48		49/50		51/52		53/54		55/56		57/58		59/60		61/62		63/64
Accept	39		40		41/42		43/44		45/46		47/48		49/50		51/52		53/54		55/56		57/58		59/60		61/62	
Available	64	65	63	64	62	64	62	64	62	64	62	64	62	64	62	64	62	64	65	64	62	64	62	64	62	64

Week	262	264	266	268	270	272
Prep	67/68					
Rehab	65/66	67/68				
Return		65/66		67/68		
Accept	63/64		65/66		67/68	
Available	62	64	64	66	66	68

Miami-Dade Transit

Rail Modernization

12-Week Cycle - 460 Week Schedule

Week	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
Prep	1																									
Rehab		1																								
Return																									1	
Accept																										1
Available	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Week	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104
Prep	2			3			4			5			6			7			8			9			10	
Rehab		2			3			4			5			6			7			8			9			10
Return					2			3			4			5			6			7			8			9
Accept						2			3			4			5			6			7			8		
Available	67	67	67	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Week	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138	140	142	144	146	148	150	152	154	156
Prep		11			12			13			14			15			16			17			18			19
Rehab	10		11			12			13			14			15			16			17			18		
Return			10			11			12			13			14			15			16			17		
Accept	9			10			11			12			13			14			15			16			17	
Available	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Week	158	160	162	164	166	168	170	172	174	176	178	180	182	184	186	188	190	192	194	196	198	200	202	204	206	208
Prep			20			21			22			23			24			25			26			27		
Rehab	19			20			21			22			23			24			25			26			27	
Return	18			19			20			21			22			23			24			25			26	
Accept		18			19			20			21			22			23			24			25			26
Available	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Week	210	212	214	216	218	220	222	224	226	228	230	232	234	236	238	240	242	244	246	248	250	252	254	256	258	260
Prep	28			29			30			31			32			33			34			35			36	
Rehab	27		28			29			30			31			32			33			34			35		36
Return		27			28			29			30			31			32			33			34			
Accept			27			28			29			30			31			32			33			34		
Available	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Week	262	264	266	268	270	272	274	276	278	280	282	284	286	288	290	292	294	296	298	300	302	304	306	308	310	312
Prep		37			38			39			40			41			42			43			44			45
Rehab	36		37			38			39			40			41			42			43			44		
Return			36			37			38			39			40			41			42			43		
Accept				36			37			38			39			40			41			42			43	
Available	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Week	314	316	318	320	322	324	326	328	330	332	334	336	338	340	342	344	346	348	350	352	354	356	358	360	362	364
Prep			46			47			48			49			50			51			52			53		
Rehab	45			46			47			48			49			50			51			52			53	
Return	44			45			46			47			48			49			50			51			52	
Accept		44			45			46			47			48			49			50			51			52
Available	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Week	366	368	370	372	374	376	378	380	382	384	386	388	390	392	394	396	398	400	402	404	406	408	410	412	414	416
Prep	54			55			56			57			58			59			60			61			62	
Rehab	53		54			55			56			57			58			59			60			61		62
Return		53			54			55			56			57			58			59			60			61
Accept			53			54			55			56			57			58			59			60		
Available	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Week	418	420	422	424	462	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460				
Prep		63			64			65			66			67			68									
Rehab	62		63			64			65			66			67			68								
Return			62			63			64			65			66			67			68					
Accept	61			62			63			64			65			66			67			68				
Available	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	67	67	67				

Miami-Dade Transit

Rail Modernization

12-Week Cycle -272 Week Schedule

Week	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
Prep	1																									
Rehab		1																								
Return																									1	
Accept																										1
Available	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Week	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104
Prep	2			3			4			5/6			7/8			9/10			11/12			13/14			15/16	
Rehab		2			3			4			5/6			7/8			9/10			11/12			13/14			15/16
Return					2			3			4			5/6			7/8			9/10			11/12			13/14
Accept						2			3			4			5/6			7/8			9/10			11/12		
Available	67	67	67	66	66	66	66	66	66	66	65	65	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Week	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138	140	142	144	146	148	150	152	154	156
Prep		17/18			19/20			21/22			23/24			25/26			27/28			29/30			31/32			33/34
Rehab	15/16		17/18			19/20			21/22			23/24			25/26			27/28			29/30			31/32		
Return			15/16			17/18			19/20			21/22			23/24			25/26			27/28			29/30		
Accept	13/14			15/16			17/18			19/20			21/22			23/24			25/26			27/28			29/30	
Available	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Week	158	160	162	164	166	168	170	172	174	176	178	180	182	184	186	188	190	192	194	196	198	200	202	204	206	208
Prep			35/36			37/38			39/40			41/42			43/44			45/46			47/48			49/50		
Rehab	33/34			35/36			37/38			39/40			41/42			43/44			45/46			47/48			49/50	
Return	31/32			33/34			35/36			37/38			39/40			41/42			43/44			45/46			47/48	
Accept		31/32			33/34			35/36			37/38			39/40			41/42			43/44			45/46			47/48
Available	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Week	210	212	214	216	218	220	222	224	226	228	230	232	234	236	238	240	242	244	246	248	250	252	254	256	258	260
Prep	51/52			53/54			55/56			57/58			59/60			61/62			63/64			65/66			67/68	
Rehab	49/50	51/52			53/54			55/56			57/58			59/60			61/62			63/64			65/66			67/68
Return		49/50			51/52			53/54			55/56			57/58			59/60			61/62			63/64			65/66
Accept			49/50			51/52			53/54			55/56			57/58			59/60			61/62			63/64		
Available	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64

Week	262	264	266	268	270	272
Prep						
Rehab	67/68					
Return			67/68			
Accept	65/55			67/68		
Available	64	66	66	66	68	

Miami-Dade Transit

Rail Modernization

14-Week Cycle - 606 Week Schedule

Week	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
Prep	1																									
Rehab		1																								
Return																									1	
Accept																										1
Available	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Week	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104
Prep	2				3				4				5				6				7				8	
Rehab		2				3				4				5				6				7				8
Return						2				3				4				5				6				7
Accept							2				3				4				5				6			
Available	67	67	67	67	66	66	66	67	66	67	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66
Week	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138	140	142	144	146	148	150	152	154	156
Prep			9				10				11				12				13				14			
Rehab		8				9				10				11				12				13				14
Return				8				9				10				11				12				13		
Accept	7				8				9				10				11				12				13	
Available	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67
Week	158	160	162	164	166	168	170	172	174	176	178	180	182	184	186	188	190	192	194	196	198	200	202	204	206	208
Prep	15				16				17				18				19				20				21	
Rehab	14		15				16				17				18				19				20			21
Return		14				15				16				17				18				19				20
Accept			14				15				16				17				18				19			
Available	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66
Week	210	212	214	216	218	220	222	224	226	228	230	232	234	236	238	240	242	244	246	248	250	252	254	256	258	260
Prep			22				23				24				25				26				27			
Rehab		21				22				23				24				25				26				27
Return				21				22				23				24				25				26		
Accept	20				21				22				23				24				25				26	
Available	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67
Week	262	264	266	268	270	272	274	276	278	280	282	284	286	288	290	292	294	296	298	300	302	304	306	308	310	312
Prep	28				29				30				31				32				33				34	
Rehab	27		28				29				30				31				32				33			34
Return		27				28				29				30				31				32				33
Accept			27				28				29				30				31				32			
Available	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66
Week	314	316	318	320	322	324	326	328	330	332	334	336	338	340	342	344	346	348	350	352	354	356	358	360	362	364
Prep			35				36				37				38				39				40			
Rehab		34				35				36				37				38				39				40
Return				34				35				36				37				38				39		
Accept	33				34				35				36				37				38				39	
Available	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67
Week	366	368	370	372	374	376	378	380	382	384	386	388	390	392	394	396	398	400	402	404	406	408	410	412	414	416
Prep	41				42				43				44				45				46				47	
Rehab	40		41				42				43				44				45				46			47
Return		40				41				42				43				44				45				46
Accept			40				41				42				43				44				45			
Available	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66
Week	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468
Prep			48				49				50				51				52				53			
Rehab		47				48				49				50				51				52				53
Return				47				48				49				50				51				52		
Accept	46				47				48				49				50				51				52	
Available	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67
Week	470	472	474	476	478	480	482	484	486	488	490	492	494	496	498	500	502	504	506	508	510	512	514	516	518	520
Prep	54				55				56				57				58				59				60	
Rehab	53		54				55				56				57				58				59			60
Return		53				54				55				56				57				58				59
Accept			53				54				55				56				57				58			
Available	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66
Week	522	524	526	528	530	532	534	536	538	540	542	544	546	548	560	562	564	566	568	570	572	574	576	578	580	582
Prep			61				62				63				64				65				66			
Rehab		60				61				62				63				64				65				66
Return				60				61				62				63				64				65		
Accept	59				60				61				62				63				64				65	
Available	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67	66	66	66	67
Week	584	586	588	590	592	594	596	598	600	602	604	606														
Prep	67				68																					
Rehab	66		67				68																			
Return		66				67				68																
Accept			66				67				68															
Available	66	66	66	67	66	66	66	67	67	67	67	68														

Miami-Dade Transit
Rail Modernization
14-Week Cycle - 272 Week Schedule

Week	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
Prep	1																									
Rehab		1																								
Return																									1	
Accept																										1
Available	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Week	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104
Prep	2/3				4/5				6/7				8/9				10/11				12/13				14/15	
Rehab		2/3				4/5				6/7				8/9				10/11				12/13				14/15
Return						2/3				4/5				6/7				8/9				10/11				12/13
Accept							2/3				4/5				6/7				8/9				10/11			
Available	66	66	66	66	64	64	64	66	64	64	64	66	64	64	64	66	64	64	64	66	64	64	64	66	64	64
Week	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138	140	142	144	146	148	150	152	154	156
Prep			16/17				18/19				20/21				22/23				24/25/26				27/28/29			
Rehab	14/15			16/17				18/19				20/21				22/23				24/25/26				27/28/29		
Return				14/15				16/17				18/19				20/21				22/23				24/25/26		
Accept	12/13				14/15				16/17				18/19				20/21				22/23				24/25/26	
Available	64	66	64	64	64	66	64	64	64	66	64	64	64	66	64	64	64	66	63	63	63	65	62	62	62	65
Week	158	160	162	164	166	168	170	172	174	176	178	180	182	184	186	188	190	192	194	196	198	200	202	204	206	208
Prep	30/31/32				33/34/35				36/37/38				39/40/41				42/43/44					45/46/47			48/49/50	
Rehab	27/28/29	30/31/32				33/34/35				36/37/38				39/40/41				42/43/44				45/46/47				48/49/50
Return		27/28/29				30/31/32				33/34/35			36/37/38					39/40/41				42/43/44				45/46/47
Accept			27/28/29				30/31/32				33/34/35			36/37/38					39/40/41				42/43/44			
Available	62	62	62	65	62	62	62	65	62	62	62	65	59	62	65	65	62	65	62	65	65	59	62	65	62	62
Week	210	212	214	216	218	220	222	224	226	228	230	232	234	236	238	240	242	244	246	248	250	252	254	256	258	260
Prep			51/52/53				54/55/59				57/58/59				60/61/62				63/64/65				66/67/68			
Rehab	48/49/50			51/52/53				54/55/56				57/58/59				60/61/62				63/64/65				66/67/68		
Return				48/49/50				51/52/53				54/55/56				57/58/59				60/61/62				63/64/65		
Accept	45/46/47				48/49/50				51/52/53				54/55/56				57/58/59				60/61/62				63/64/65	
Available	62	65	62	62	62	65	62	62	62	65	62	62	62	65	62	62	62	65	62	62	62	65	62	62	62	65

Week	262	264	266	268	270	272
Prep						
Rehab	66/67/68					
Return		66/67/68				
Accept			66/67/68			
Available	65	65	65	68		