SOAC
STATE-OF-THE-ART CAR
DEVELOPMENT PROGRAM
FINAL TEST REPORT
VOLUME 2: SUBSYSTEM FUNCTIONAL TESTING

Boeing Vertol Company
(A division of The Boeing Company)
Surface Transportation Systems Branch
Philadelphia, Pa. 19142

NOVEMBER 1974
FINAL REPORT

Availability is unlimited. Document may be released to the National Technical Information Service, Springfield, Virginia 22151, for sale to the public.

Prepared for
URBAN MASS TRANSPORTATION ADMINISTRATION
Office of Research and Development
Washington, D.C. 20590
NOTICE

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.
This document, Volume II of SOAC Final Test Report D174-10024 presents the test results for the subsystem functional testing of two state-of-the-art transit cars. The SOAC has been developed under UMTA's Urban Rapid Rail Vehicle & Systems Program which has the objective of enhancing the attractiveness of rapid rail transportation to the urban traveler by providing him with transit vehicles that are as comfortable, reliable, safe and economical as possible. The SOAC is one phase of this program.

The purpose of these tests was to show compliance with the SOAC Detail Specification IT-06-0026-73-2. All subsystem functional tests were conducted by the car manufacturer, St. Louis Car Division, General Steel Ind., Inc. Tests were conducted at the manufacturer's St. Louis plant and at the DOT High Speed Ground Test Center, Pueblo, Colo. After adjustments & changes where required, all subsystems met the requirements of the detail specification.

This document, Volume II plus the following additional volumes comprise Boeing Vertol Report D174-10024, State-of-the-Art Car Final Test Report as specified in Section 17.1.4.2 of the SOAC Detail Specification.

Volume I - Component Testing
Volume III - Acceptance Testing
Volume IV - Simulated Demonstration Test
Volume V - Post Repair Testing

The SOAC detail specification is available from the National Technical Information Services (NTIS).

Key Words: Subsystems Functional Testing State-of-the-Art Car Rapid Transit Car UMTA URRV Program
TITLE  STATE-OF-THE-ART CAR FINAL TEST REPORT

VOLUME II - SUBSYSTEM FUNCTIONAL TESTING

FOR LIMITATIONS IMPOSED ON THE USE OF THE INFORMATION CONTAINED IN THIS DOCUMENT AND ON THE DISTRIBUTION OF THIS DOCUMENT, SEE LIMITATIONS SHEET.

MODEL  SOAC  CONTRACT  DOT-UT-10007

ISSUE NO.  ISSUED TO:  

PREPARED BY  DATE 10-29-73

APPROVED BY  DATE 10-31-73

APPROVED BY  DATE 11-6-73

APPROVED BY  

A. Vollmecke
<table>
<thead>
<tr>
<th>LTR</th>
<th>DESCRIPTION</th>
<th>DATE</th>
<th>APPROVAL</th>
</tr>
</thead>
</table>


SOAC FINAL TEST REPORT  
VOLUME II - SUBSYSTEM FUNCTIONAL TESTING

Table of Contents

1. INTRODUCTION ........................................................ 1

2. INSTRUMENTATION..................................................... 2

3. TEST PROCEDURES AND RESULTS .................................. 3
   3.1 CAR BODY ......................................................... 3
   3.2 LIGHTING .......................................................... 44
   3.3 WIRING ............................................................ 60
   3.4 EQUIPMENT ....................................................... 71
   3.5 MAIN PROPULSION CONTROL AND
        MOTOR ROTATION .............................................. 104
   3.6 BRAKING .......................................................... 108
   3.7 PROPULSION AUXILIARIES ..................................... 119
   3.8 CAR WEIGHT ....................................................... 122
   3.9 PANTOGRAPH ...................................................... 126
   3.10 AIR COMPRESSOR ................................................. 130
   3.11 HOSTLING PANEL ............................................... 131
   3.12 VISUAL .......................................................... 133

4. CONCLUSIONS .......................................................... 136
1. INTRODUCTION

The U. S. Department of Transportation, Urban Mass Transportation Administration (UMTA), under Contract DOT-UT-10007, has engaged the Boeing Vertol Company to act as Systems Manager of the Urban Rapid Rail Vehicle and Systems Program. This program is an integrated development program directed toward improving high speed, frequent-stop urban rail systems. The overall objective is to enhance the attractiveness of rail transportation to the urban traveler by providing service that is as comfortable, reliable, safe and economical as possible.

The objective of the State-of-the-Art Car (SOAC) is to demonstrate the best state-of-the-art in rapid rail car design, with two new improved cars using existing proven technology. Primary goals for the cars are passenger convenience and operating efficiency.

The SOAC Test Program Plan and Procedures are described in Boeing Vertol Report D174-1007-1. The subsystem functional testing was conducted in accordance with these procedures by the car manufacturer, St. Louis Car Division, General Steel Industries, Inc. These tests were primarily conducted at the manufacturer's St. Louis plant during July and August 1972, with a few tests accomplished at the DOT High Speed Ground Test Center, Pueblo, Colorado between September 1972 and March 1973.

This document, Volume II - Subsystem Functional Testing, plus the following additional volumes comprise Boeing Vertol Report D174-10024, State-of-the-Art Car Final Test Report as specified in Section 17.1.4.2 of the SOAC Detail Specification.

Volume I - Component Testing
Volume III - Acceptance Testing
Volume IV - Simulated Demonstration Test
Volume V - Post Repair Testing
2. INSTRUMENTATION

The following facilities, equipment and instruments were used for the subsystem functional tests.

2.1 FACILITIES EQUIPMENT

Water Test Facility
Hot and Cold Room
100 VAC, 220 VAC, 440 VAC
600 VDC
120 PSI Air Pressure
Switching Locomotives
Car Building Facilities as required

2.2 INSTRUMENTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemometer</td>
<td>Taylor</td>
</tr>
<tr>
<td>Anemometer</td>
<td>Alnor</td>
</tr>
<tr>
<td>Static Pressure Indicator</td>
<td>Dwyer</td>
</tr>
<tr>
<td>Multimeter</td>
<td>Simpson</td>
</tr>
<tr>
<td>Thermometer</td>
<td>Simpson</td>
</tr>
<tr>
<td>Megger</td>
<td>Biddle</td>
</tr>
<tr>
<td>Foot Candle Meter</td>
<td>Weston</td>
</tr>
<tr>
<td>Noise Meter</td>
<td>General Radio</td>
</tr>
<tr>
<td>Temperature Recorder</td>
<td>Honeywell</td>
</tr>
<tr>
<td>Oscilloscope</td>
<td>Hewlett-Packard</td>
</tr>
<tr>
<td>Oscillator</td>
<td>Hewlett-Packard</td>
</tr>
<tr>
<td>Frequency Counter</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Hi-Pot Tester</td>
<td>Associated Research</td>
</tr>
<tr>
<td>Digital Multimeter</td>
<td>Non-Linear Systems</td>
</tr>
<tr>
<td>Digital Multimeter</td>
<td>Hickok</td>
</tr>
<tr>
<td>Ammeter</td>
<td>Weston</td>
</tr>
<tr>
<td>Trainline Test Boxes</td>
<td>St. Louis Car</td>
</tr>
<tr>
<td>Thermo-Anemometer</td>
<td>Alnor</td>
</tr>
</tbody>
</table>
3. TEST PROCEDURES AND RESULTS

The subsystem functional tests were conducted to check out car subsystems prior to acceptance testing. The subsystems tests were primarily conducted at St. Louis Car during production of the cars although a few tests were conducted at the High Speed Ground Test Center, Pueblo, Colorado.

The test procedures followed were essentially those contained in Section "B" of Document DL74-10007-1. In some cases actual test procedures differed from DL74-10007-1; e.g., the air comfort procedures. The procedures included in this section of the report are those that were actually employed. The results of the tests were recorded on data sheets which are included. The signatures on the data sheets attest to satisfactory completion.

It is to be noted the designations for Car No. 1 and Car No. 2 used on the data sheets for the subsystem functional testing at St. Louis Car refer to the high and low density cars as follows:

Car No. 1 - High density car
Car No. 2 - Low density car

This nomenclature is applicable to this volume only, as it was changed when the cars arrived at the HSGTC for acceptance testing.

3.1 CAR BODY

a. Body Compression, Vertical Load and Car Body Load

The SOAC body frame and car body are substantially the same as the R-44 structure. Since the R-44 was subjected to compression and vertical load tests, the SOAC tests were waived. A review of this data was accomplished by Boeing Vertol and St. Louis Car engineers.

The analysis of the structural changes that are unique to the SOAC was reviewed by Boeing Vertol and St. Louis Car engineers. These changes include windscreen structure, headlining, bulkheads, trim, bolsters and pantograph mounting.
b. Gathering Range and Couple/Uncouple

1. Move two cars onto level tangent track. Orient cars #2 end to #2 end.

2. Center coupler on #1 car. Offset coupler on #2 car 3-3/8" to the hook side. Couple cars. Observe that cars couple properly without deformation or galling of hooks.

3. Uncouple cars.

4. Center coupler on #1 car. Offset coupler on #2 car 3-3/8" to the socket side. Couple cars. Observe that cars couple properly without deformation or galling of hooks.

5. Uncouple cars.

6. Center coupler on #1 car. Displace coupler on #2 car 3" upward or downward and roll the coupler head 5°. Couple the cars. Observe that the hooks do not deform or gall.
GATHERING RANGE AND COUPLE/UNCouple (Contd.)

Test Results

Test Date: 8-28-72

Car # 18-2

Conclusions:

Couplers have sufficient gathering range. YES

Test Data:

1. Couple cars with couplers displaced to "A" Side of Center
   #2 End OK

2. Couple cars with couplers displaced to "B" side of Center
   #2 End OK

3. Couple cars with #2 car rotated 5°
   OK

Tested By: [Signature] Date: 8/3/72

Approved By (Engr.): [Signature] Date: 8-28-72

Approved By (Q.A.): [Signature] Date: 8-28-72
c. Electric Couplers

NOTES: 1. For this test the air must be removed from the couplers.

2. The following test will be conducted using the test box connected to coupler No. 2 and the coupler control panel at No. 2 end of the car.

1. Place the following circuit breakers on the LVCBP to the position indicated:

   CPLR On

2. On test box observe and record:

   L1-9 Illuminated.

3. On test box place the following switches to the position indicated (lamps in the next paragraph will be illuminated momentarily):

   L1-10 On

4. On test box observe and record:

   R1-10 Illuminated

   R1-11 Off for two seconds then illuminated for ten seconds (approx.).

   L1-11 Off for two seconds then illuminated for ten seconds (approx.).

   Observe that when hook switch is made that R1-9 is illuminated on test box.

5. On test box place the following switches to the position indicated:

   L1-10 Off

6. On test box observe and record:

   R1-10 Off
   R1-11 Off
   L1-11 Off
c. **Electric Couplers** (Contd.)

7. On test box place the following switches to the position indicated:

<table>
<thead>
<tr>
<th>Switch</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1-8</td>
<td>On</td>
</tr>
</tbody>
</table>

8. On test box observe and record:

<table>
<thead>
<tr>
<th>Switch</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1-8</td>
<td>Illuminated</td>
</tr>
<tr>
<td>L1-7</td>
<td>Illuminated</td>
</tr>
<tr>
<td>R1-7</td>
<td>Illuminated</td>
</tr>
<tr>
<td>L1-12</td>
<td>Illuminated (Dim)</td>
</tr>
<tr>
<td>R1-12</td>
<td>Illuminated (Dim)</td>
</tr>
</tbody>
</table>

9. On test box place the following switches to the position indicated:

<table>
<thead>
<tr>
<th>Switch</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1-8</td>
<td>Off</td>
</tr>
</tbody>
</table>

10. On test box observe and record:

<table>
<thead>
<tr>
<th>Switch</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1-8</td>
<td>Off</td>
</tr>
<tr>
<td>R1-12</td>
<td>Off</td>
</tr>
<tr>
<td>L1-12</td>
<td>Off</td>
</tr>
<tr>
<td>R1-7</td>
<td>Off</td>
</tr>
<tr>
<td>L1-7</td>
<td>Off</td>
</tr>
</tbody>
</table>

11. On coupler control panel place the **coupler control** key switch to the **ON** position.

12. On the coupler control panel depress the switches in the table below, observe and record lamps on test box, then release switch:

<table>
<thead>
<tr>
<th>Depress</th>
<th>Observe and Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Retrieve</td>
<td>L1-7 Illuminated</td>
</tr>
<tr>
<td></td>
<td>R1-7 Illuminated</td>
</tr>
<tr>
<td>b. Advance</td>
<td>L1-11 Illuminated</td>
</tr>
<tr>
<td></td>
<td>R1-11 Illuminated</td>
</tr>
<tr>
<td></td>
<td>R1-10 Illuminated</td>
</tr>
<tr>
<td>c. Uncouple</td>
<td>R1-8 Illuminated</td>
</tr>
<tr>
<td></td>
<td>R1-7 Illuminated</td>
</tr>
<tr>
<td></td>
<td>L1-7 Illuminated</td>
</tr>
</tbody>
</table>

13. On the coupler control panel place the **coupler control** key switch to the **OFF** position.

14. Place the following circuit breakers on the LVCP to the position indicated:

<table>
<thead>
<tr>
<th>Circuit Breaker</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPLR</td>
<td>Off</td>
</tr>
</tbody>
</table>
Test Result - SOAC - Electric Couplers

Test Date: 8-19-72  Car #: 1

Conclusion:
1. EP circuits function properly. Yes
2. Switches function properly. Yes

Tested By: [Signature]

Date: 8-19-72

Approved By (Engr): [Signature]

Date: 8-19-72

Approved By (Q.A.): [Signature]

Date: 8-19-72
Test Result: SOAC - Electric Couplers B-2-C

Test Date: 8-19-72

Conclusion:

1. EP circuits function properly. yes
2. Switches function properly. yes

Tested By: [Signature]

Date: 

Approved By (Engr): [Signature]

Date: 8-19-72

Approved By (Q.A.): [Signature]

Date: 8-19-72
d. Camber

1. After the car body is complete, including underframe equipment (not including trucks) level bolsters at #1 end of car. (Support cars at lateral pads only.)

2. Sight the "A" side bottom side sill at three places (centerline of bolsters and center of car).

3. Repeat step #2 for "B" side.

Note: Use a transit for sighting and use rod calibrated to 1/64 of an inch. Arithmetic average of readings at "A" and "B" will be the datum for determining deflection at "C".
CAMBER (Cont'd.)

Test Results

Test Date: 8/8/72  Car #: H DO C

Test Conclusion:
1. Car has positive camber 3/8 - 1/2

<table>
<thead>
<tr>
<th>Side</th>
<th>A</th>
<th>B (in)</th>
<th>(\frac{A+B}{2})</th>
<th>(\frac{C-(A+B)}{2})</th>
<th>Camber</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>3/4</td>
<td>7/8</td>
<td>7/16</td>
<td>7/16</td>
</tr>
<tr>
<td>A</td>
<td>1-1/16</td>
<td>27/32</td>
<td>61/64</td>
<td>23/64</td>
<td>3/8</td>
</tr>
<tr>
<td>B</td>
<td>3-1/2</td>
<td>3</td>
<td>3-1/4</td>
<td>23/64</td>
<td>7/16</td>
</tr>
<tr>
<td>B</td>
<td>3-3/8</td>
<td>3</td>
<td>3-3/16</td>
<td>1/2</td>
<td>1/2</td>
</tr>
</tbody>
</table>

Tested By:  
Approved By (Engr):  
Approved By (Q/A):  

AUG 17 1972
d. CAMBER (Cont'd.)

Test Results

Test Date: 8-12-72  Car #: 2

Test Conclusion:
1. Car has positive camber  $A = \frac{7}{16}$  $B = \frac{9}{16}$

<table>
<thead>
<tr>
<th>Side</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>$\frac{A + B}{2}$</th>
<th>$\frac{(A + B)}{2}$</th>
<th>Camber</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4-1/2</td>
<td>3-3/4</td>
<td>4-9/16</td>
<td>4-1/8</td>
<td>4-9/16 - 4-1/8</td>
<td>7/16</td>
</tr>
<tr>
<td>B</td>
<td>9-7/8</td>
<td>9-1/4</td>
<td>10-1/8</td>
<td>9-9/16</td>
<td>10-1/8 - 9-9/16</td>
<td>9/16</td>
</tr>
</tbody>
</table>

Tested By: Gary Lowery  Date: 8/12/72
Approved By (Engr.): E. J. Deans  Date: 8/12/72
Approved By (Q.A.): P. O. Reed  Date: 8/12/72

* LESS SEATS AND CARPETING

AUG 18 1972
e. Clearance Check

1. Pass completed car with airsprings properly inflated through SOAC clearance gauge.

2. Note any interferences.
e. CLEARANCE CHECK (Contd.)

Test Results

Test Date: ________________  Car # __________

Conclusion:

1. Car passes through the clearance gauge.

Tested by: __________________________  Date: ________

Approved by (Engr.): __________________________  Date: ________

Approved by (Q.A.): __________________________  Date: ________

No record of test having been performed.
DATA SHEET NOT IN FILES

ESK 4/26/73
e. CLEARANCE CHECK (Contd.)

Test Results

Test Date: ________________  Car #: 2

Conclusion:

1. Car passes through the clearance gauge.

Tested by: ___________________________  Date: __________

Approved by (Engr.): ___________________________  Date: __________

Approved by (Q.A.): ___________________________  Date: __________

NO RECORD OF TEST HAVING BEEN PERFORMED
DATA SHEET NOT IN FILES

E. RO 4/24/73
f. Curve and Clearance

1. Move #1 end of car onto the transfer table.

2. For floor height = 3' 10-1/2" move the transfer table 10' to the left and right of centerline (145' curve, 10° 42" truck angle). Observe that there are no interferences.

3. Move #2 end of car onto the transfer table and repeat step #2.

4. Couple cars with #2 ends together. Pull cars through a 145' curve. Observe that there are no interferences between bonnets.

5. Repeat for 3' 5-1/2" floor height for CTS. Move the transfer table 5'1-7/16" to the left and right of centerline (295' curve 5° truck angle). Observe that there are no interferences between truck and car body.

6. Move #2 end of car onto the transfer table and repeat Step 5.
Test Results

Test Date: 8-28-72

Test Conclusions

1. There are no interferences between car and truck on the #1 end. OK

2. There are no interferences between car and truck on the #2 end. OK

3. There are no interferences between cars when #2 ends are coupled. OK

Tested By: L REED Date: 8-28-72

Approved by (Engr.) H. Kennedy Date: 8-28-72

Approved by (Q.A) L.D. Reed Date: 8-28-72
CURVE AND CLEARANCE (Contd.)

Test Results

Test Date: 5-28-72  Car # 2

Test Conclusions

1. There are no interferences between car and truck on the #1 end.  
   OK

2. There are no interferences between car and truck on the #2 end.  
   OK

3. There are no interferences between cars when #2 ends are coupled.  
   OK

Tested By: L. Reed  Date: 2-28-72
Approved by (Engr.) [Signature]  Date: 8-28-72
Approved by (Q.A) L. D. Reed  Date: 8-28-72
g. Air Comfort

Heating and Air Conditioner Operation

1. Remove the four thermostats from sensor No. 1 and connect one of the R-44-1C-3 test boxes to the sensor as follows:

<table>
<thead>
<tr>
<th>R-44-1C-3</th>
<th>Sensor Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59° (Heat)</td>
</tr>
<tr>
<td>2</td>
<td>71° or 72° (Cool 1)</td>
</tr>
<tr>
<td>3</td>
<td>74° (Reheat)</td>
</tr>
<tr>
<td>4</td>
<td>76° (Cool 2)</td>
</tr>
</tbody>
</table>

2. Repeat item 1 for sensor No. 2 and the other R-44-1C-3 test box.

3. On both the R-44-1C-3 test boxes place the switches to the position indicated:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Place the following circuit breakers on the LVCBP to the position indicated:

<table>
<thead>
<tr>
<th></th>
<th>H</th>
<th>HH1</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Place the following circuit breakers on the HVCBP to the position indicated:

<table>
<thead>
<tr>
<th></th>
<th>FH</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td></td>
</tr>
</tbody>
</table>

6. Observe and record:

Floor Heat Off

7. On test box that is connected to sensor No. 1 place switch No. 1 to the OFF position.

8. Observe and record:

Floor Heat On

9. On test box that is connected to sensor No. 1 place switch No. 1 to the ON position.

10. Observe and record:

Floor Heat Off
11. On test box that is connected to sensor No. 2 place switch No. 1 to the OFF position.

12. Observe and record:

Floor Heat On

13. On test box that is connected to sensor No. 2 place switch No. 1 to the ON position.

14. Observe and record:

Floor Heat Off

15. Place the following circuit breakers on the HVCBP to the position indicated:

FH Off

16. On the motorman's console press the AIR COMFORT ON switch.

17. On test box R-44-1C-2 observe and record:

L2-27 Illuminated
R2-27 Illuminated

18. On test box R-44-1C-1 observe and record:

R2-27 Illuminated

19. Place the following circuit breakers on the HVCBP to the position indicated:

FH On
OHH-1 On
BF-1 On
A/CC-1 On

20. Using the table below check the heating and air conditioning system:

<table>
<thead>
<tr>
<th>SENSOR NO. 1 SWITCH SETTING</th>
<th>OBSERVE AND RECORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) 1 Off</td>
<td>FH On; OHH-1 On</td>
</tr>
<tr>
<td>2 Off</td>
<td>BF-1 On (at low speed); A/CC-1 Off</td>
</tr>
<tr>
<td>3 Off</td>
<td></td>
</tr>
<tr>
<td>4 Off</td>
<td></td>
</tr>
</tbody>
</table>
g. Air Comfort (Contd.)

<table>
<thead>
<tr>
<th>SENSOR NO. 1 SWITCH SETTING</th>
<th>OBSERVE AND RECORD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>20.</strong> B) 1 On 2 Off 3 Off 4 Off</td>
<td>FH Off; OHH-1 Off BF-1 On (at low speed) A/CC-1 Off</td>
</tr>
<tr>
<td>C) 1 On 2 On 3 Off 4 Off</td>
<td>FH Off; OHH-1 Off BF-1 On (at high speed) A/CC-1 On (with reheat)</td>
</tr>
<tr>
<td>D) 1 On 2 On 3 On 4 Off</td>
<td>FH Off; OHH-1 Off A/CC-1 On (without reheat) BF-1 On (high speed)</td>
</tr>
<tr>
<td>E) 1 On 2 On 3 On 4 On</td>
<td>Same as D) except A/CC-1 at max. cool</td>
</tr>
</tbody>
</table>

21. On the motorman's console press the AIR COMFORT OFF switch.

22. Observe and record:

All heating and air conditioning - Off

23. On the motorman's console press the AIR COMFORT ON switch.

24. Observe and record:

Heating and air conditioning system same as in 20 E).

25. On test box connected to No. 1 sensor place the switches to the position indicated:

1 On 2 Off 3 Off 4 Off

26. Place the following circuit breakers on the HVCBP to the position indicated:

| OHH-1 BF-1 A/CC-1 FH BF-2 OHH-2 A/CC-2 |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Off              | Off              | Off              | On               | On               | On               | On               |
g. **Air Comfort** (Contd.)

27. Using the test box connected to sensor No. 2 and observing system No. 2, repeat item 20 through item 25.

28. On the motorman's console press the **AIR COMFORT OFF** switch.

29. On test box R-44-1C-2 observe and record:

   |   |   |
   | L2-27 | Off |
   | R2-27 | Off |

30. On test box R-44-1C-1 observe and record:

   |   |   |
   | R2-27 | Off |

31. Place the following circuit breakers on the HVCBP to the position indicated:

   |   |   |
   | PH  | Off |
   | BF-2 | Off |
   | OHH-2 | Off |
   | A/CC-2 | Off |

32. Place the following circuit breakers on the LVCBP to the position indicated:

   |   |   |
   | H  | Off |
   | HH-1 | Off |
g. AIR COMFORT (Co: d.)

Test Results

Test Date: 7-25-72

Car#: 1

Conclusion:

1. "A" End unit responds to thermostat ____________ yes

"B" End unit responds to thermostat ____________ yes

Test Data:

<table>
<thead>
<tr>
<th>Condition</th>
<th>(O=Open, C=Closed, *=Open or Closed)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Air</td>
<td>Overhead Thermo</td>
<td>Duct Therm</td>
</tr>
<tr>
<td>35°</td>
<td>70° 72° 74° 75°</td>
<td>76°</td>
</tr>
<tr>
<td>C</td>
<td>0 0 0 0 0</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>0 0 0 0 0</td>
<td>C</td>
</tr>
<tr>
<td>0</td>
<td>0 0 0 0 0</td>
<td>0</td>
</tr>
<tr>
<td>*</td>
<td>C 0 0 0 0</td>
<td>*</td>
</tr>
<tr>
<td>*</td>
<td>C C 0 0 0</td>
<td>*</td>
</tr>
<tr>
<td>*</td>
<td>C C C 0 0</td>
<td>*</td>
</tr>
<tr>
<td>*</td>
<td>C C C C C</td>
<td>*</td>
</tr>
</tbody>
</table>

2. Layover Therm Closed.

Floor Heat ON.

Tested By: [Signature]

Approved By (Engr.): [Signature]

Approved By (Q.A.): [Signature]

Date: 7-25-72
Test Results

Test Date: 8-16-72

Conclusion:
1. "A" End unit responds to thermostat [ ]
2. "B" End unit responds to thermostat [ ]

Test Data:

<table>
<thead>
<tr>
<th>Condition</th>
<th>(O=Open, C=Closed, * = Open or Closed)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fresh Air</td>
<td></td>
<td>Full Overhead and Floor Heat ON.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 KW Overhead Heat ON Floor Heat ON.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Floor Heat ON.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 KW Overhead Heat ON.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All Heat OFF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 KW Overhead Heat ON.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modulated Cooling No Heat.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Full Cooling.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Floor Heat ON.</td>
</tr>
</tbody>
</table>

2. Layover Thermo Closed.

Tested By: [Signature]
Date: 8-16-72

Approved By (Eng.): [Signature]
Date: 8-16-72

Approved By (Q.A.): [Signature]
Date: 8-16-72
h. Water Test

1. Spray roof evenly with water at a rate of 40 gallons per minute and nozzle pressure of 40 psi.

   Note and repair all leaks.

2. Spray completed shell with water at a rate of 120 gallons per minute and a nozzle pressure of 40 psi.

   Note and repair all leaks.

3. Spray completed car with water at a rate of 120 gallons per minute at a nozzle pressure of 40 psi.

   Note and repair all leaks.
h. WATER TEST (Contd.)

Test Results

Test Date: 8-19-72

Test Conclusion:

1. There are no leaks in the roof.
2. There are no leaks in the shell.
3. There are no leaks in the completed car.

Car # 1

Date Inspection
12-22-72
3-6-72
8-9-72

Tested By: L.D. Reed
Date: 8-19-72

Approved By (Engr): J. Fleming
Date: 8-19-72

Approved By (Q.A.): L.D. Reed
Date: 8-19-72

※ Reference Water Test Inspection Sheet.
h. WATER TEST (Contd.)

Test Results

Test Date: 8-17-72  
Car #: 2

Test Conclusion:

1. There are no leaks in the roof.
2. There are no leaks in the shell.
3. There are no leaks in the completed car.

Tested By: [Signature]  
Date: 8-17-72

Approved By (Engr.): [Signature]  
Date: 8-17-72

Approved By (Q.A.): [Signature]  
Date: 8-17-72
i. **End Door**

**End Door Procedure**

1. Place the following circuit breakers on the LVCBP to the position indicated:

   - EDL On
   - EDS On

2. On the motorman's console place the **END DOOR** switch to unlock position.

3. On the motorman's console observe and record:

   - End doors unlocked indicator - Illuminated

4. On text box R-44-lC-1 observe and record:

   - R2-23 Illuminated
   - R2-24 Illuminated
   - L2-24 Illuminated

5. Observe and record that end door is unlocked and can be opened.

6. On the motorman's console place the **END DOOR** switch to the locked position.

7. On the motorman's console observe and record:

   - End door indicator Off

8. On test box R-44-lC-1 observe and record:

   - R2-23 Off
   - R2-24 Off
   - L2-24 Off

9. Using the key supplied, open the end door, observe and record that when the end door is open that the **END DOOR UNLOCKED INDICATOR** on the motorman's console is illuminated.

10. Place the following circuit breakers on the LVCBP to the position indicated:

    - EDL Off
    - EDS Off
i. END DOOR (Contd.)

Test Results:

Test Date: 7-28-72

Conclusion:

1. End Door Lock Electrically
   yes
2. End Door Lock Mechanically
   yes
3. End Door Unlock Electrically or Mechanically
   yes
4. End Door Unlock Electrically from Outside
   yes
5. End Door Latches without assistance
   yes

Test Data:

2. Closing Force 9 Lbs.

Tested By: Clyde Thompson

Approved By (Engr.): D. Keeney

Approved By (Q.A.): T. Francis

Date: July 28, 1972

Date: 7-28-72

Date: 7-28-72
1. END DOOR (Contd.)

Test Results:

Test Date: 8-28

Car # __

Conclusion:
1. End Door Lock Electrically ________ Yes
2. End Door Lock Mechanically ________ Yes
3. End Door Unlock Electrically or Mechanically ________ Yes
4. End Door Unlock Electrically from Outside ________ Yes
5. End Door Latches without assistance ________ Yes

Test Data:
1. Opening Force ________ 27 ________ Lbs.
2. Closing Force ________ 7 ________ Lbs.

Tested By: ___________________________  Date: 8-28-72

Approved By (Engr.): ___________________________  Date: 8-28-72

Approved By (Q.A.): ___________________________  Date: 8-28-72
j. Side Door

Side Door Operation

1. Place the following circuit breakers on the LVCBP to the position indicated:

   D-8  On
   24  On
   DC-1  On
   DC-2  On

   Note: In junction box #1 connect jumper between terminals 88 and 110.

2. On test box R-44-lC-l place the following switches to the positions indicated:

   L2-7  On
   L1-15  On

3. On the motorman's console observe and record:

   Side doors closed indicator - Illuminated

4. In the cab unlock the "B" door control unit.

5. Observe and record:

   On motorman's console side doors closed indicator - Off
   On "B" door control unit zone signal lamps - Illuminated

6. On test box R-44-lC-2 observe and record:

   L2-7  Off
   L1-15  Off
   R2-7  Off
   R1-15  Off

7. On test box R-44-lC-1 observe and record:

   R2-7  Illuminated
   R1-15  Illuminated

8. On "B" door control unit press the DOORS FORWARD OPEN switch.
j. **Side Door** (Contd.)

9. On test box R-44-1C-2 observe and record the following while switch in Item 8 is depressed:

- R2-2  
  - Illuminated
- R2-1  
  - Illuminated
- L1-15  
  - Off
- R1-15  
  - Off

10. Observe and record:

  All "B" doors - Closed

11. On "B" door control unit press the DOORS REAR OPEN switch.

12. Observe and record:

  All "B" side doors - Open
  All "B" side door signal lamps - Illuminated
  Zone signal lamp above DOORS REAR switch - Off

13. On "B" door control unit press the DOORS FORWARD CLOSE switch.

14. Observe and record:

  All "B" doors - Open

15. On test box R-44-1C-2 observe and record the following while switch in Item 13 is depressed:

- R2-3  
  - Illuminated

16. On "B" door control unit press the DOORS REAR CLOSE switch.

17. Observe and record:

  All "B" doors - Closed
  All "B" doors signal lamps - Off
  Zone signal lamp above DOOR REAR switch - Illuminated

18. Lock the "B" door control unit.

19. Observe and record:

  On motorman's console side doors closed indicator - Illuminated

20. Using key open the last door on the "B" side from the crew station.
j. **Side Door** (Contd.)

21. Observe and record:

   On motorman's console side doors closed indicator - Off

   On door that is open signal lamp is illuminated.

22. Unlock the "B" door control unit, press the DOOR REAR CLOSE switch; lock the "B" door control unit.

23. Observe and record:

   On motorman's console side doors closed indicator - Illuminated

   All "B" doors - Closed

   All "B" door signal lamps - Off

24. Unlock the "A" door control unit.

25. Observe and record:

   On motorman's console side doors closed indicator - Off

   Zone signal lamps on "A" door control unit - Illuminated

26. On test box R-44-1C-1 observe and record:

   R1-15
   R2-7
   Illuminated
   Illuminated

27. On test box R-44-1C-2 observe and record:

   L2-7
   L1-15
   R2-7
   R1-15
   Off
   Off
   Off
   Off


29. Observe and record:

   All "A" doors - Closed
j. **Side Door** (Contd.)

30. On test box R-44-1C-2 observe and record the following while switch in Item 28 is depressed:

<table>
<thead>
<tr>
<th>Switch</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2-1</td>
<td>Illuminated</td>
</tr>
<tr>
<td>L2-2</td>
<td>Illuminated</td>
</tr>
<tr>
<td>L1-15</td>
<td>Off</td>
</tr>
<tr>
<td>R1-15</td>
<td>Off</td>
</tr>
</tbody>
</table>


32. Observe and record:

- All "A" doors - Open
- All "A" door signal lamps - Illuminated

33. On "A" door control unit press the DOOR FORWARD CLOSE switch.

34. Observe and record:

- All "A" doors - Open

35. On test box R-44-1C-2 observe and record the following while the switch in Item 33 is depressed:

<table>
<thead>
<tr>
<th>Switch</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2-3</td>
<td>Illuminated</td>
</tr>
</tbody>
</table>

36. On "A" door control unit press the DOOR REAR CLOSE switch.

37. Observe and record:

- All "A" doors - Closed
- All "A" door signal lamps - Off
- Zone signal lamp above DOOR REAR switch - Illuminated

38. Lock the "A" door control unit.

39. Observe and record:

- On motorman's console SIDE DOOR CLOSED indicator - Illuminated

40. Using the key open the last door on the "A" side from the crew station.

41. Observe and record:

- On motorman's console SIDE DOOR CLOSED indicator - Off
- On the door that is open, door signal lamps - Illuminated.
j. **Side Door** (Contd.)

42. Measure and record the voltage between the 56970518 relay panel door control "A" side terminal "34" and car body ground.

43. On the motorman's console depress SIDE DOOR BYPASS switch, repeat Item 42, then release switch.

44. Unlock the "A" door control unit, press DOOR REAR CLOSE switch, lock "A" door control unit.

45. Observe and record:

- On motorman's console side door closed indicator - Illuminated
- All "A" side doors - Closed
- All "A" side door signal lamps - Off

46. Place the following switches on test box R-44-1C-1 to the position indicated:

- L2-1 On
- L2-2 On

47. Observe and record the following:

- On test box R-44-1C-2, R2-1 and R2-2 - Illuminated
- All doors on "B" side - Open

48. Place the following switches on test box R-44-1C-1 to the position indicated:

- L2-1 Off
- L2-2 Off
- L2-3 On

49. Observe and record the following:

- On test box R-44-1C-2, R2-1 and R2-2 - Off
- On test box R-44-1C-2, R2-3 - Illuminated
- All doors on "B" side - Closed

50. Place the following switches on test box R-44-1C-1 to the position indicated:

- L2-3 Off
- R2-1 On
- R2-2 On
j. **Side Door (Contd.)**

51. Observe and record the following:

   On test box R-44-1C-2, R2-3 - Off
   On test box R-44-1C-2, L2-1, L2-2 - Illuminated
   All doors on "A" side - Open

52. Place the following switches on test box R-44-1C-1 to the position indicated:

   - R2-1: Off
   - R2-2: Off
   - R2-3: On

53. Observe and record the following:

   On test box R-44-1C-2, L2-1 and L2-2 - Off
   On test box R-44-1C-2, L2-3 - Illuminated
   All doors on "A" side - Closed

54. Place the following switches in test box R-44-1C-1 to the position indicated:

   - R2-3: Off

55. Observe and record the following:

   On test box R-44-1C-2, L2-3 - Off
j. SIDE DOOR (Contd.)

Test Results

Test Date: 7-27-72   Car # 1

Conclusions:
1. "A" Side Doors respond to "A" Side Conductor's Panel. YES
2. "B" Side Doors respond to "B" Side Conductor's Panel. YES
3. Side Doors respond to trainline signals. YES
4. Trainlines respond to "A" and "B" Side Conductor's Panel. YES

Test Data:
1. Door Open Time.  1.6  Seconds.
2. Door Close Time.  2.0  Seconds.

Tested By: Clyde Thomas  Date: July 27, 1972

Approved by (Engr.) E. Kenney  Date: 7-27-72

Approved by (Q.A.) K. J. Franco  Date: 7-27-72
j. SIDE DOOR (Contd.)

Test Results

Test Date: 8-24-72  Car # 2

Conclusions:

1. "A" Side Doors respond to "A" Side Conductor's Panel. YES
2. "B" Side Doors respond to "B" Side Conductor's Panel. YES
3. Side Doors respond to trainline signals. YES
4. Trainlines respond to "A" and "B" Side Conductor's Panel. YES

Test Data:

1. Door Open Time. 1.6 Seconds.
2. Door Close Time. 2.0 Seconds.

Tested By: [Signature] Date 8-24-72

Approved by (Engr.) [Signature] Date 9-24-72

Approved by (Q.A.) [Signature] Date 8-24-72
k. JACKING PROCEDURE

1. The car may be jacked only at jacking pads (four) places.
2. The car must be jacked evenly at opposite side jacking pads.
3. The car may be jacked at either end or both ends simultaneously.
4. May be jacked for car weight at rail of 113,000 lbs.

Test Results

Test Date: AUG 4 Car Number: 1

Conclusions:

Jacking tests were performed satisfactorily with no evident permanent set in car structure.

Test Data:

1. Car jacked at No. 1 end sill pads only (2 points) average load per jack 14300 lbs.
2. Car jacked at No. 2 end sill pads only (2 points) average load per jack 14300 lbs.
3. Car jacked at No. 1 and No. 2 end sill pads simultaneously (4 points) average load per jack 14300 lbs.

Tested by: Date: AUG 1/71

Approved by (Engr.): Date: AUG 1/71

Approved by (QA): Date: AUG 1/72
k. JACKING PROCEDURE

1. The car may be jacked only at jacking pads (four) places.
2. The car must be jacked evenly at opposite side jacking pads.
3. The car may be jacked at either end or both ends simultaneously.
4. May be jacked for car weight at rail of 113,000 lbs.

Test Results

Test Date: AUG 11/72  Car Number: 2

Conclusions:

Jacking tests were performed satisfactorily with no evident permanent set in car structure.

Test Data:

1. Car jacked at No. 1 end sill pads only (2 points) average load per jack 14,300 lbs.
2. Car jacked at No. 2 end sill pads only (2 points) average load per jack 14,300 lbs.
3. Car jacked at No. 1 and No. 2 end sill pads simultaneously (4 points) average load per jack 14,300 lbs.

Tested by: [Signature]  Date: AUG 11/72

Approved by (Engr.): [Signature]  Date: AUG 11/72

Approved by (On): [Signature]  Date: AUG 11/72
1. **Windshield**

1. With windshield in position and locked, measure force required to unlock both latches. Measurement should be made at finger grips.

2. Check that latches do not foul the windshield when opening.

3. Measure force required to push windshield away from seals. Measurement should be made at the frame midway between latches.

4. Check that windshield folds back greater than 90°.

NOTE: Windshield will foul the windshield wiper. Use caution so as not to damage the wiper arm.
Test Result  -  SOAC  -  Windshield

Test Date: 8-19-72  Car #: 1

Conclusions: Windshield can be opened as an emergency exit.

Test Data:

<table>
<thead>
<tr>
<th>Top</th>
<th>Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>31</td>
</tr>
<tr>
<td>2.5 lbs.</td>
<td>25.5 lbs.</td>
</tr>
<tr>
<td>3. Open Angle</td>
<td>90°</td>
</tr>
</tbody>
</table>

Tested By: L. D. Reed  Date: 8-19-72
Approved by (Eng.) T. J.  Date: 8-19-72
Approved by (Q.A.) L. D. Reed  Date: 8-19-72
Test Result - SOAC - Windshield

Test Date: 8-12-72  Car # 2

Conclusions: Windshield can be opened as an emergency exit. YES

Test Data:

1. Latch unlock force 12.5 lbs, 15.5 lbs.
2. Windshield open force 32.5 lbs.
3. Open Angle 90°

Tested By: P.O. Rdo  Date: 8-12-72
DATA: Approved by (Eng.)  Date: 8-14-72
Approved by (Q.A.)  Date: 8-12-72
3.2 LIGHTING

a. Headlights and Tail Lights

Head and Tail Light Operation

1. Place the following circuit breakers on the LVCBP to the position indicated:
   - Cutout Cont. On

2. On the motorman's console unlock the FORWARD-REVERSE switch.

3. Place the FORWARD-REVERSE switch to the FORWARD position.

4. Observe and record:
   - Head lamps Illuminated
   - Tail lamps Off

5. Place the FORWARD-REVERSE switch to the REVERSE position.

6. Observe and record:
   - Head lamps Off
   - Tail lamps (#1 end) Illuminated

7. Place the FORWARD-REVERSE switch to the OFF position.

8. Observe and record:
   - Head lamps Off
   - Tail lamps Illuminated*

*Tail lamps will be OFF if CPLR pins are advanced.

9. Place the FORWARD-REVERSE switch to the FORWARD position. (NOTE: The switch will remain in this position unless otherwise specified.)

10. Aim the headlights.
a. HEAD AND TAIL LIGHTS (Contd.)

Test Results

Test Date: 7-25-72

Car #

Conclusions:

1. Headlights function
2. Headlights aimed
3. Back-up lights aimed
4. Back-up lights function
5. Taillights #1 End Function
6. Taillights #2 End Function

Tested By: 

Date: 7-25-72

Approved By (Engr.):

Date: 7-25-72

Approved By (Q.A.):

Date: 7-25-72
a. HEAD AND TAIL LIGHTS (Contd.)

Test Results

Test Date: __8-17-72__

Car #: __2__

Conclusions:

1. Headlights function __YES__
2. Headlights aimed __YES__
3. Back-up lights aimed __NO ADJUSTMENT__
4. Back-up lights function __YES__
5. Taillights #1 End Function __YES__
6. Taillights #2 End Function __YES__

Tested By: __Leo Moody__

Date: __8-17-72__

Approved By (Engr.): __A. K. Keene__

Date: __8-17-72__

Approved By (Q:A.): __E. R. Rud__

Date: __8-17-72__
b. **Cab Lights**

**Cab Light Operation**

1. Place the following circuit breakers on the HVCBP to the position indicated:
   
   | CL | On |
   |

2. Observe and record:
   
   Cab Lights Illuminated

3. Place the following circuit breakers on the HVCBP to the position indicated:
   
   | CL | Off |
   |

4. Observe and record:
   
   Cab Lights Off
b. CAB LIGHTS (Contd.)

Test Results

Test Date: 7-25-72   Car # 1

Conclusions:

1. Cab light function independently from car lights. 

2. Cab light level is satisfactory.

Test Data:

<table>
<thead>
<tr>
<th>Light Level</th>
<th>Ambient F/C</th>
<th>Left Side F/C</th>
<th>Right Side F/C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Tested By: [Signature]   Date: 7-25-72
Approved by (Engr.) [Signature]   Date: 7-25-72
Approved by (Q.A.) [Signature]   Date: 7-25-72
b. CAB LIGHTS (Contd.)

Test Results

Test Date: 8-16-72 Car #: 2

Conclusions:

1. Cab light function independently from car lights. Yes
2. Cab light level is satisfactory. Yes

Test Data:

<table>
<thead>
<tr>
<th>Light Level</th>
<th>Ambient F/C</th>
<th>Left Side F/C</th>
<th>Right Side F/C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

Tested By: [Signature] Date: 8-16-72

Approved by (Engr): [Signature] Date: 8-16-72

Approved by (Q.A.): [Signature] Date: 8-16-72
c. **Console Lights**

**Motorman's Console Lamp Test**

1. Place the following circuit breakers on the LVCBP to the position indicated:

   *Cutout Cont.* On

2. On the motorman's console press the LAMP TEST switch.

3. Observe and record:

   All lamps on the motorman's console - Illuminated.
   (NOTE: It may be necessary to turn the dimmer control located on the speedometer for speedometer lights only.)
c. CONSOLE LIGHTS (Cont.)

Test Results

Test Date: 7-28-72

Car #: 1

Conclusions:

1. All lamps function. YES

2. Lamp-test button functions.

Tested By: [Signature]
Date: July 28-72

Approved by (Engr.): [Signature]
Date: 7-28-72

Approved by (Q.A.): [Signature]
Date: 7-28-72
c. CONSOLE LIGHTS (Contd.)

Test Results

Test Date: 8-16-72  Car # 2

Conclusions:

1. All lamps function.  yes
2. Lamp test button functions. yes

Tested By:  Leo Murphy  Date: 8-16-72

Approved by (Engr.)  Date: 8-16-72
L. J. Ferguson

Approved by (Q.A.)  Date: 8-16-72
K.J. Francis
d. **Emergency Lights**

**Emergency Light Operation**

1. Place the following circuit breakers on the LVCBP to the position indicated:

   \[
   \begin{array}{ll}
   L1 & \text{On} \\
   ELH & \text{On}
   \end{array}
   \]

2. On the motorman's console press the INTERIOR MAIN LIGHTS ON switch.

3. Observe and record:

   \[
   \begin{array}{ll}
   \text{All main lights} & \text{Off} \\
   \text{All emergency lights} & \text{Illuminated}
   \end{array}
   \]

4. On the motorman's console press the INTERIOR MAIN LIGHTS OFF switch.

5. Observe and record:

   \[
   \begin{array}{ll}
   \text{All main lights} & \text{Off} \\
   \text{All emergency lights} & \text{Off}
   \end{array}
   \]

6. Place the following circuit breakers on the LVCBP to the position indicated:

   \[
   \begin{array}{ll}
   L1 & \text{Off} \\
   ELH & \text{Off}
   \end{array}
   \]
d. EMERGENCY LIGHTS (Contd.)

Test Result

Test Date: 7-25-72  Car #: 1

Conclusions:

1. Emergency Lights operate satisfactorily ✓

Test Data:

1. Time from 600 V removal to emergency light operation 19 Seconds.
2. Emergency Light battery drain 5 Amps.

Tested By: Nick Sarawaj Date: 7-25-72

Approved By (Engr.)  Date: 7-25-72

Approved By (Q.A.)  Date: 7-25-72

* 600V REMOVAL SIMULATED BY REMOVING I2
d. "EMERGENCY LIGHTS (Contd.)"

Test Result

Test Date: 8-17-72 Car # 2

Conclusions:

1. Emergency Lights operate satisfactorily

Test Data:

1. Time from 600 V removal to emergency light operation 24 second
2. Emergency Light battery drain 2.75 Amps.

Tested By: [Signature] Date: 8-17-72

Approved By (Engr.): [Signature] Date: 8-17-72

Approved By (Q.A.): [Signature] Date: 8-17-72

600V REMOVAL SIMULATED BY REMOVING I2 INPUT TO INVERTER
e. Main Lighting

Main Lights Operation

1. Place the following circuit breakers on the LVCBP to the position indicated:

   L1  On
   ELH On

2. Place the following circuit breakers on the HVCBP to the position indicated:

   ML On

3. On the motorman's console press the INTERIOR MAIN LIGHTS ON switch.

4. Observe and record:

   All main lights Illuminated
   All emergency lights Off

5. On test box R-44-1C-2 observe and record:

   L2-28 Illuminated
   R2-28 Illuminated

6. On test box R-44-1C-1 observe and record:

   R2-28 Illuminated

7. On the motorman's console press the INTERIOR MAIN LIGHTS OFF switch.

8. Observe and record:

   All main lights Off
   All emergency lights Off

9. On test box R-44-1C-2 observe and record:

   L2-28 Off
   R2-28 Off

10. On test box R-44-1C-1 observe and record:

    R2-28 Off

11. Measure the light level at the seated reading plane, at seats nearest the #1 end side doors, the center side doors and the #2 end side doors.
12. Measure the light level 20" laterally from the centerline of each side door on the "A" side of the car 36" above the floor.

13. Measure the inverter output voltage and frequency.

14. Measure the inverter input voltage and frequency.

15. Place the following circuit breakers on the HVCBP to the position indicated:

   ML  Off

16. Place the following circuit breakers on the LVCBP to the position indicated:

   L1  Off
   ELH  Off
Test Results - SOAC - Main Lighting.

Test Date: 7-25-72  Car #: 1

Conclusions:

1. Overhead Lights provide sufficient light level.

Test Data:

1. Light Level
   - "A" End: 38 CPFC
   - Center: 38 CPFC
   - "B" End: 39 CPFC
   - #2 Door: 52 CPFC
   - #4 Door: 36 CPFC
   - #6 Door: 34 CPFC
   - #8 Door: 54 CPFC

2. Inverter Output Voltage: 566 VAC
   - 1333 Hz

3. Inverter Input Voltage: 38 VDC

Tested By: Nick Toravan  Date: 7-25-72

Approved By (Engr.)  Date: 7-25-72

Approved By (Q.A.)  Date: 7-15-72

**Simulated by external signal**
e. MAIN LIGHTING (Contd.):

Test Results

Test Date: 0-29-72  Car #: 2

Conclusions:

1. Overhead Lights provide sufficient light level.

Test Data:

1. Light Level
   - "A" End: 35 CP FC
   - Center: 36 CP FC
   - "B" End: 36 CP FC
   - #2 Door: 51 CP FC
   - #4 Door: 30 CP FC
   - #6 Door: 29 CP FC
   - #8 Door: 52 CP FC

2. Inverter Output Voltage: 425 VAC

3. Inverter Input Voltage: 35 VDC

Tested By: [Signature]  Date: 8-29-72

Approved By (Engr.): [Signature]  Date: 8-29-72

Approved By (Q.A.): [Signature]  Date: 8-29-72
3.3 WIRING

a. High Potential

1) Objective: To verify that wiring and electrical equipment have sufficient insulation resistance to car body.

2) Requirements:

(a) 32-volt circuits must withstand a potential of 1100 VAC for one minute without breakdown.

(b) 600-volt circuits must withstand a potential of 2500 VAC for one minute without breakdown.

(c) 230-volt circuits must withstand a potential of 1500 VAC for one minute without breakdown.

(d) All circuits, when the ground lead is lifted, must show a resistance to ground of 250,000 ohms.

3) Equipment: Hipot - Associated Research Model 4452-MI. Trip indicator shall reset for 1 amp or less: Megger - Biddle Model 100 V.

Instrument shall have an accuracy of ±5% or better and shall have been calibrated within the 18-month period prior to the test.

4) Results: All results shall be recorded in a logical manner and related to the test requirements. All requirements shall have a tolerance of ±10% unless otherwise specified.

5) General Instructions:

(a) Before Megger test:
   - Remove battery leads.
   - Open all circuit breakers.
   - Remove battery charger and motor alternator leads.
   - Disconnect radio, fluorescent ballasts, temperature controls and P.A.

(b) Before Hipot test:
   - Short all 32-volt wiring together.
   - Short all 600-volt wiring together.
   - Short all 230-volt AC wiring together.

(c) Truck shall be tested per AIEE Standard #16, Electric Control Apparatus for Land Transportation Vehicles. AIEE Standard #11, Rotating Electric Machinery.

(d) Car body wiring shall be tested per IEEE Standard #14, Techniques for Dielectric Tests.
Test Results - SOAC - Hipot

Test Date: 11 July 1972 Car # 1

Conclusions:
1. No. Breakdown in 32 VDC circuits
   - OK
2. No. Breakdown in 600 VDC circuits
   - OK
3. No. Breakdown in 230 VAC circuits
   - OK

Test Data:
1. Minimum insulation resistance ≥ 2.5 MEG OHMS
2. Hipot Voltage 32 VDC circuits 1100 VAC
3. Hipot Voltage 600 VDC circuits 2500 VAC
4. Hipot Voltage 230 VAC circuits 1500 VAC

Tested By: Kenneth J. Franzi Date: 7-11-72
Approved By (Engr.) Date: 7-11-72
Approved By (Q.A.) Kenneth J. Franzi Date: 7-11-72

NOTES:
12 Wires were found shorted to ground (AC control area)
All wires replaced.
a. HIGH POTENTIAL (Contd.)

Test Results

Test Date: 8/2-72

Conclusions:

1. No. Breakdown in 32 VDC circuits 0:K
2. No. Breakdown in 600 VDC circuits O.K.
3. No. Breakdown in 230 VAC circuits O.K.

Test Data:

1. Minimum insulation resistance \( \geq 2.5 \ \text{Mega Ohms} \)
2. Hipot Voltage 32 VDC circuits 1100 VAC
3. Hipot Voltage 600 VDC circuits 2500 VAC
4. Hipot Voltage 230 VAC circuits 1500 VAC

Tested By: [Signature]

Date: 8/2-72

DATA Approved By (Engr.) [Signature]

Date: 8-10-72

Approved By (Q.A.) [Signature]

Date: 8-2-72

Note:

1. 9 WIRES AT A/C CONTROL PANEL SHORTED TO GROUND.
2. FL-2 AT INVERTER SHORTED TO GRND.
3. OH-2 SHORTED TO GRND.

ALL WIRES REPLACED AND RECHECK O.K. 2/1.
b. **Main Power Application**

1. Connect 600 VDC source to the car.

2. Place the following circuit breakers on the HVCBP to the position indicated:
   - Motor Alternator Field - On
   - Alternator Voltage Regulator - On

3. Place the following circuit breakers on the LVCBP to the position indicated:
   - BATT On
   - CC On
   - C On
   - MAC On

4. Check the Motor Alternator for function, unusual noise or vibration. Measure and record the following:
   - Input Voltage (DC)
   - Input Current (DC)
   - Output Voltage $\phi_A$ (AC)
   - Output Voltage $\phi_B$ (AC)
   - Output Voltage $\phi_C$ (AC)
   - Output Frequency

5. Place the circuit breakers in Items 2 and 3 - OFF.

6. Disconnect the positive (+) terminal of the battery from the output of the battery charger.

7. Place circuit breakers in Items 2 and 3 - ON.

8. Turn on Battery Charger (HVCB - overhead panel).

9. Measure and record the Battery Charger output voltage.

10. Place circuit breakers in Items 2, 3 and 9 - OFF.

11. Reconnect battery to Battery Charger.
Test Results

Test Date: 8-21-72  Car # 1

Conclusions:

Motor Alternator Voltage is satisfactory

Test Data:

1. Input Voltage

2. No Load Condition
   a. Input Current
   b. Phase A Voltage
   c. Phase B Voltage
   d. Phase C Voltage
   e. Output Frequency
   f. Rectifier Output Voltage

3. Loaded Condition
   a. Input Current
   b. Phase A Voltage
   c. Phase B Voltage
   d. Phase C Voltage
   e. Output Frequency
   f. Rectifier Output Voltage

<table>
<thead>
<tr>
<th>Condition</th>
<th>Voltage</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>595 VDC</td>
<td></td>
</tr>
<tr>
<td>No Load</td>
<td>222 VAC</td>
<td>59.5 Hz</td>
</tr>
<tr>
<td>Loaded</td>
<td>221 VAC</td>
<td>35 VDC</td>
</tr>
</tbody>
</table>

Tested By: [Signature]  Date 8/21/72

Approved By (Engr.): [Signature]  Date 8-21-72

Approved By (Q.A.): [Signature]  Date 8-21-72
Test Results

Test Date: 8-19-72 Car #: 2

Conclusions:

Motor Alternator Voltage is satisfactory: yes

Test Data:

1. Input Voltage
   
2. No Load Condition
   a. Input Current
   b. Phase A Voltage
   c. Phase B Voltage
   d. Phase C Voltage
   e. Output Frequency
   f. Rectifier Output Voltage

3. Loaded Condition
   a. Input Current
   b. Phase A Voltage
   c. Phase B Voltage
   d. Phase C Voltage
   e. Output Frequency
   f. Rectifier Output Voltage

Tested By: [Signature]
Approved By (Engr.): [Signature]
Approved By (Q.A.): [Signature]

Date 8-19-72
c. Trainlines

(NOTE: The following test will be a continuity check of the coupler switches. There will be no power on the car and coupler test boxes must be OFF.)

1. Manually advance coupler pins on No. 2 coupler.

2. Using multimeter check for indication specified at the following points:

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
<th>INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>JB2-77</td>
<td>JB2-12</td>
<td>Open</td>
</tr>
<tr>
<td>JB2-16</td>
<td>JB2-15</td>
<td>Open</td>
</tr>
<tr>
<td>JB2-34</td>
<td>JB2-56</td>
<td>Open</td>
</tr>
<tr>
<td>JB2-13</td>
<td>CPLR #2 L1-15</td>
<td>Open</td>
</tr>
<tr>
<td>JB2-13</td>
<td>CPLR #2 R1-15</td>
<td>Open</td>
</tr>
</tbody>
</table>

3. Manually retrieve coupler pins on coupler No. 2.

4. Repeat Item 2 except the indication shall be SHORT.

5. Check continuity between #1 and #2 junction box for all listed trainlines, "Door Open 'A'" thru "Zone Lights."

Door Open "A"
Door Closed "A"
Door Open "B"
Door Closed "B"
Traction Interlock
   EMV1
   EMV2
Propulsion Trip Indicator
Snow Brake ON
Snow Brake Indicator
Friction Brake Indicator
Hand Brake Indicator
Brake B+
Slip/Slide Indicator
CSR Control
Crawl Mode
Reset
Forward
Reverse
"P" Signal
"P" Signal Return
SP2
SP1
Motorman Signal Light
Zone Light
**Test Results**

**Test Date**: OCT 1972  
**Car #**: 1

**Conclusions:**

1. **There is continuity between #1 end junction box and #2 end junction box.**  
   - **YES**

2. **There is continuity below #2 end junction box and #2 end coupler.**  
   - **YES**

**Test Data:**

<table>
<thead>
<tr>
<th>Line</th>
<th>Continuity Checked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door Open &quot;A&quot;</td>
<td></td>
</tr>
<tr>
<td>Door Closed &quot;A&quot;</td>
<td></td>
</tr>
<tr>
<td>Door Open &quot;B&quot;</td>
<td></td>
</tr>
<tr>
<td>Door Closed &quot;B&quot;</td>
<td></td>
</tr>
<tr>
<td>Traction Interlock.</td>
<td></td>
</tr>
<tr>
<td>EMV1</td>
<td></td>
</tr>
<tr>
<td>EMV2</td>
<td></td>
</tr>
<tr>
<td>Propulsion Trip Indicator</td>
<td></td>
</tr>
<tr>
<td>Snow Brake ON</td>
<td></td>
</tr>
<tr>
<td>Snow Brake Indicator</td>
<td></td>
</tr>
<tr>
<td>Friction Brake Indicator</td>
<td></td>
</tr>
<tr>
<td>Handbrake Indicator</td>
<td></td>
</tr>
<tr>
<td>Brake B+</td>
<td></td>
</tr>
<tr>
<td>Slip/Slide Indicator</td>
<td></td>
</tr>
<tr>
<td>CSR Control</td>
<td></td>
</tr>
<tr>
<td>Crawl Mode</td>
<td></td>
</tr>
<tr>
<td>React</td>
<td></td>
</tr>
</tbody>
</table>
### c. TRAINLINES (Contd.)

**Test Results:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forward</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reverse</strong></td>
<td></td>
</tr>
<tr>
<td>&quot;P&quot; Signal</td>
<td></td>
</tr>
<tr>
<td>&quot;P&quot; Signal Return</td>
<td></td>
</tr>
<tr>
<td>SP2</td>
<td></td>
</tr>
<tr>
<td>SPL</td>
<td></td>
</tr>
<tr>
<td>Motorman Signal Light</td>
<td></td>
</tr>
<tr>
<td>Zone Light</td>
<td></td>
</tr>
</tbody>
</table>

**Tested By:** [Signature]

**Date:** AUG 21/72

**Approved By: (Engr)** [Signature]

**Date:** [Signature]

**Approved By: (Q.A)** [Signature]

**Date:** [Signature]
c. TRAINLINES (Contd.)

Test Results

Test Date **OCT 1972**

Car # **2**

Conclusions:

1. There is continuity between #1 end junction box and #2 end junction box. **YES**

2. There is continuity below #2 end junction box and #2 end coupler. **YES**

Test Data:

<table>
<thead>
<tr>
<th>Line</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door Open &quot;A&quot;</td>
<td>X</td>
</tr>
<tr>
<td>Door Closed &quot;A&quot;</td>
<td></td>
</tr>
<tr>
<td>Door Open &quot;B&quot;</td>
<td></td>
</tr>
<tr>
<td>Door Closed &quot;B&quot;</td>
<td></td>
</tr>
<tr>
<td>Traction Interlock</td>
<td></td>
</tr>
<tr>
<td>EMV1</td>
<td></td>
</tr>
<tr>
<td>EMV2</td>
<td></td>
</tr>
<tr>
<td>Propulsion Trip Indicator</td>
<td></td>
</tr>
<tr>
<td>Snow Brake ON</td>
<td></td>
</tr>
<tr>
<td>Snow Brake Indicator</td>
<td></td>
</tr>
<tr>
<td>Friction Brake Indicator</td>
<td></td>
</tr>
<tr>
<td>Handbrake Indicator</td>
<td></td>
</tr>
<tr>
<td>Brake B+</td>
<td></td>
</tr>
<tr>
<td>Slip/Slide Indicator</td>
<td></td>
</tr>
<tr>
<td>CSR Control</td>
<td></td>
</tr>
<tr>
<td>Crawl Mode</td>
<td></td>
</tr>
<tr>
<td>Reset</td>
<td></td>
</tr>
</tbody>
</table>
c. TRAINLINES (Contd.)

Test Results:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward</td>
<td></td>
</tr>
<tr>
<td>Reverse</td>
<td></td>
</tr>
<tr>
<td>&quot;P&quot; Signal</td>
<td></td>
</tr>
<tr>
<td>&quot;P&quot; Signal Return</td>
<td></td>
</tr>
<tr>
<td>SP2</td>
<td></td>
</tr>
<tr>
<td>SPL</td>
<td></td>
</tr>
<tr>
<td>Motorman Signal Light</td>
<td></td>
</tr>
<tr>
<td>Zone Light</td>
<td></td>
</tr>
</tbody>
</table>

Tested By: [Signature]  Date: AUG 10/72

Approved By: (Engr) [Signature]  Date: SEP 10/72

Approved By: (QA) [Signature]  Date: AUG 10/72
3.4 EQUIPMENT

a. Windshield Wiper

Windshield Wiper Operation

1. Place the following circuit breakers on the LVCBP to the position indicated:

   Cutout Cont.   On

2. On the motorman's console place the WINDSHIELD WIPER switch to the following positions, observe and record:

   SLOW: Windshield Wiper ON low speed
   FAST: Windshield Wiper ON high speed
   OFF: Windshield Wiper OFF
a. WINDSHIELD WIPER (Contd.)

Test Results

Test Date: ____________________________ Car #__________

Conclusions:

1. Windshield Wiper Functions__________________________

2. Windshield Washer Functions__________________________

Test Data:

1. Wiping Frequency W.P.S.__________________________ Max.

2. Air Pressure P.S.I.__________________________

Tested By:________________________________________ Date:_______

Approved By(Engr.)________________________________ Date:_______

Approved By(Q.A)______________________________ Date:_______

TEST RESULT SHEET - NOT IN FILES

E-30 4/26/73
a. WINDSHIELD WIPER (Contd.)

Test Results

Test Date: 8-26-72 Car # 2

Conclusions:

1. Windshield Wiper Functions ________ yes
2. Windshield Washer Functions ________ yes

Test Data:

1. Wiping Frequency W.P.S. _______ 2 _______ Max.
2. Air Pressure P.S.I. _______ 90 _______

Tested By: [Signature] Date: 8-26-72

Approved By (Engr.): [Signature] Date: 8-26-72

Approved By (Q.A): [Signature] Date: 8-26-72
b. Horn

Horn Operation

1. Place the following circuit breakers on the LVCBP to the position indicated:

   Cutout Cont.    On

2. On the motorman's console press the HORN switch. Observe and record. Horn is loud enough to be audible from a 500-ft. distance, above a train noise.
b. HORN (Contd.)

Test Results

Test Date: 7-31-72  Car #

Conclusions:

1. Horn functions properly

Test Data:

1. Horn Pressure  PSI  14.5 Max.
   PSI  Min.  NOT MEASURABLE

Tested By:  Date: 7-31-72
Approved By(Engr.):  Date: 7-31-72
Approved By(Q.A.):  Date: 7-31-72
5. HORN (Contd.)

Test Results

Test Date: 9-25-72 Car # 2

Conclusions:

1. Horn functions properly

Test Data:

1. Horn Pressure PSI 145 Max.

Not Measurable

Tested By: [Signature] Date: 9-25-72

Approved By (Engr): [Signature] Date: 9-25-72

Approved By (Q.A.): [Signature] Date: 9-25-72
Public Address System (PA) Operation

1. Place the following circuit breakers on the LVCBP to the position indicated:
   - HH-1: On
   - H: On
   - PA: On

2. On the motorman's console press the AIR COMFORT ON switch.

3. Using "B" microphone station, observe and record that the PA system is operational.

4. Using "A" microphone station, observe and record that the PA system is operational.

5. On the motorman's console place the COMMUNICATIONS switch to the PA position.

6. Using the handset, observe and record that the PA system is operational.

7. On the motorman's console press the AIR COMFORT OFF switch.

8. Place the following circuit breakers on the LVCBP to the position indicated:
   - PA: Off
   - H: Off
   - HH-1: Off
c. PUBLIC ADDRESS (Contd.)

Test Results

Test Date: 7-31-72  Car # 1

Conclusion:

1. All speakers balanced  yes
2. Chime circuit functions  yes
3. Motormans handset functions  yes

Test Data:

1. Speaker #1 Output db at 3'
   #2  94
   #3  88.5
   #4  89
   #5  88
   #6  92
   #7  88
   #8  92

2. Noise Level db at 3'
   62

Tested by: Clyde Thomas  Date: July 31, 1972

Approved by (Engr.): F. Kenny  Date: 7-31-72

Approved by (Q.A.):  Date: 7-31-72
c. PUBLIC ADDRESS (Contd.)

Test Results

Test Date: 8-20-72 Car # 2

Conclusion:
1. All speakers balanced YES
2. Chime circuit functions YES
3. Motormans handset functions YES

Test Data:
1. Speaker #1 Output db at 3'
   #2   91
   #3   88
   #4   86
   #5   98
   #6   90
   #7   86
   #8   95
2. Noise Level db at 3'
   80

Tested by: [Signature] Date: 8-20-72

Approved by (Engr.) [Signature] Date: 8-20-72

Approved by (Q.A.) [Signature] Date: 8-20-72
d. Radio

1. Place the following circuit breakers on the LVCBP to the position indicated:

   RAD       On

2. Measure and record the voltage between radio rack connector "P1 pin 2" at car body ground.

3. Place the circuit breaker in Item 1 - OFF.

4. Measure and record the voltage between radio rack connector "P1 per 2" and car body ground.

5. Place the circuit breaker in Item 1 ON.

6. Place the mode selector switch on the motorman's console to RADIO. Depress the handset trigger and communicate with another car.

7. Transmit from another. Observe that the car receives.
d. RADIO (Contd.)

Test Results

Test Date: 1-31-72  Car # 1

Conclusion:

1. Car #1 receives from and transmits to Car #2  YES
2. Car #2 receives from and transmits to Car #1  YES

Tested by: Clyde Thomas  Date: July 31, 72

Approved by (Engr.)  Date: 7-31-72

Approved by (Q.A.)  Date: 7-31-72

CAR #2 WAS PUT IN SHOP 7. RECEIVED OK.
d. RADIO (Contd.)

Test Results

| Test Date: 8-28-72          | Car #: 2          |

Conclusion:

1. Car #1 receives from and transmits to Car #2: **yes**
2. Car #2 receives from and transmits to Car #1: **yes**

Tested by: [Signature] Date: 8/28/72

Approved by (Engr.): [Signature] Date: 8-28-72

Approved by (Q.A.): [Signature] Date: 8-28-72
e. **BATTERY:**

1. Read specific gravity of cells. Average specific gravity must read 1.210 ± .020 corrected to 77°F.

2. Add distilled water to bring electrolyte level to 2-1/4" above plates.

3. Charge battery at 20 amperes for 17 hours.

4. Discharge batteries at 20 amperes for approximately six (6) hours or until cell voltage reaches 1.0 volts.

5. Charge battery at 20 amperes for 8 hours.

6. Check car battery charging voltage. Car voltage must be 37.0-37.5 volts.

7. Check battery open circuit voltage. Battery voltage must be 31.0-34 volts.

**Test Results**

**Test Date:** Sept 25, 1972  
**Car Number:** 1

**Conclusions:**

Battery conforms to specifications:

**Test Data:**

1. Average Specific Gravity of cells:

2. Battery charging voltage:

3. Battery open circuit voltage:

**Tested by:** [Signature]  
**Date:** Sept 25, 1972

**Approved by (Engr.):** [Signature]  
**Date:** APR 10/73

**Approved by (QA):** [Signature]  
**Date:** 4/10/73
e. BATTERY:

1. Read specific gravity of cells. Average specific gravity must read 1.210 ± 0.020 corrected to 77°F.

2. Add distilled water to bring electrolite level to 2-1/4" above plates.

3. Charge battery at 20 amperes for 17 hours.

4. Discharge batteries at 20 amperes for approximately six (6) hours or until cell voltage reaches 1.0 volts.

5. Charge battery at 20 amperes for 8 hours.

6. Check car battery charging voltage. Car voltage must be 37.0-37.5 volts.

7. Check battery open circuit voltage. Battery voltage must be 31.0-34 volts.

Test Results

Test Date: Sep 26, 1972

Car Number: 2

Conclusions:

Battery conforms to specifications:

Test Data:

1. Average Specific Gravity of cells:

2. Battery charging voltage:

3. Battery open circuit voltage:

Tested by: (Signature)
Date: Sep 28, 1972

Approved by (Engr.):
Date: Apr 18, 1973

Approved by (QA):
Date: 4/10/73
f. SIDE SIGN

Side Sign Operation:

1. Place the following circuit breakers on the LVCDP to the position indicated:
   
   - Cutout-Cont.: On
   - 10A: On
   - 10B: On

2. Insert console key into sign key switch and observe that the curtain moves forward and reverse in response to key position.

3. Check operation of both side signs using key.

4. Place the following circuit breakers on the LVCDP to the position indicated:

   - Cutout-Cont.: Off
   - 10A: Off
   - 10B: Off

Test Results

Test Date: 7-25-72  Car Number: #1

Conclusions:

Side sign operation is satisfactory:

Tested by: [Signature]  Date: 7-25-72

Approved by (Engr.): [Signature]  Date: 7-25-72

Approved by (QA): [Signature]  Date: 7-25-72
f. SIDE SIGN

Side Sign Operation:

1. Place the following circuit breakers on the LVCBP to the position indicated:

   Circuit  Control
   10A   On
   10B   On

2. Insert console key into sign key switch and observe that the curtain moves forward and reverse in response to key position.

3. Check operation of both side signs using key.

4. Place the following circuit breakers on the LVCBP to the position indicated:

   Circuit  Control
   10A   Off
   10B   Off

Test Results
Test Date: 9-10-72

Conclusions:
Side sign operation is satisfactory: Yes

Tested by: J. Hispanic __________ Date: 9-10-72

Approved by (Engr.): _______ Date: 8-10-72

Approved by (QA): _______ Date: 8-10-72
g. **Air Comfort System**

1. **Objective:** To verify that the air comfort system has been installed properly and is functioning as certified by the individual suppliers.

2. **Design Objectives:**
   
   2.1 Heat capacity to maintain an inside temperature of 70°F with an outside temperature of -15°F.
   
   2.2 Cooling capacity to maintain an inside temperature of 75°F with an outside temperature of 105°F.
   
   2.3 Total air volume of the evaporator blower fans to be 4000 cfm of which 1800 cfm is to be fresh air and 2200 cfm recirculated air.
   
   2.4 The cab to have sufficient heat capacity to maintain a temperature of 70°F with an outside temperature of -15°F.
   
   2.5 No heater guard to be hotter than 150°F.
   
   2.6 Layover heat (floor heat only) shall warm the car to 55°F at an outside temperature of 10°F.

3. **Equipment:** These tests to be performed in the thermal test chamber of St. Louis Car. All instruments shall have an accuracy of ±5% or better and shall have been calibrated within the 18-month period prior to the test.

4. **Results:** All results shall be recorded in a logical manner identified along with the test requirements. All requirements shall be adhered to with a tolerance of ±10% unless otherwise specified by Engineering. All equipment which exceeds the requirements shall be acceptable provided the additional capacity adds to the comfort of the passengers or conversely does not add to the discomfort of the passengers.

5. **General Instructions:** Cooling tests require 230 VAC, 3-phase, 60 Hz power either from wayside or from the motor alternator. The heating tests require 600 VDC. The air conditioning equipment motors are rated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condenser Fan Motor</td>
<td>2.0 KW</td>
</tr>
<tr>
<td>Compressor Motor</td>
<td>15.9 KW max. input</td>
</tr>
<tr>
<td></td>
<td>10.8 KW design input</td>
</tr>
<tr>
<td>Blower Fan Motor</td>
<td>1.0 HP</td>
</tr>
<tr>
<td>Control Voltage</td>
<td>37.5 DC</td>
</tr>
</tbody>
</table>
g. **Air Comfort System (Contd.)**

6. **Air Baffle Adjustment:** The fresh and recirculated air is to be adjusted by a baffle in the return air grille of each evaporator blower unit to approach design objectives of:

<table>
<thead>
<tr>
<th>Fresh Air</th>
<th>900 cfm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recirculated Air</td>
<td>1100 cfm</td>
</tr>
</tbody>
</table>

The fresh and recirculated air volumes are to be measured and recorded. The total air shall be the sum of the fresh and recirculated air readings. This test to be conducted on one car and like baffles applied to subsequent cars in the same lot. Measure and record the static positive pressure in the car.

7. **Thermocouple:** Locate thermocouples to reflect average room temperature at the condenser fan inlets and fresh air to the evaporator blower fan inlets. Locate thermocouples inside the car to AAR Specification for temperature readings, Section 3, page 1-3-4.

8. **Heating:**

8.1 **Thermal capacity determination.**

8.1.1 Soak car in cold room approx. eight hours.
8.1.2 Read temperature in cold room. Read temperature in car at start of test.
8.1.3 With air comfort system turned off and controls to floor heat disconnected, energize 12 KW floor heat resistors. Allow car to reach equilibrium. Record power and ambient temperature. Calculate heat loss.
8.1.4 **Sample calculation:**

\[
\text{KW Input} = 12 \\
\text{BTU} = 12 \times 3413 \\
\text{Ambient} = 65^\circ F \\
\text{Car Temp.} = 18 \\
\text{BTU loss equals: } \frac{12 \times 3413}{65^\circ F - 18^\circ F} = 871
\]
g. **Air Comfort System** (Contd.)

8.2 In-Service Heat Test:

8.2.1 Soak car in cold room approx. eight hours.
8.2.2 Record temp. of cold room prior to turning on heat.
8.2.3 Record temp. inside car prior to turning on heat.
8.2.4 Turn air comfort system and cab heat on and record temperatures of cold room and car throughout the test. Record time when air comfort and cab heat is turned on and when significant events take place.

Significant events take place at 35°, 40°, 50°, 70° and 76°F. At ambient temperature above 35, 16 KW is off. At car temp. of 40°, 12 KW floor heat is turned on. At car temp. of 50°, 12 KW floor heat is turned off. At car temp. above 70°, 9 KW is turned off and when 9 KW is off, 16 KW and 12 KW floor heat is off. At car temp. above 76°, 16 KW is turned off.

8.2.5 Record when 16 KW first cycles off.
8.2.6 Record when 9 KW cycles off; i.e., when car reaches 70°F.
8.2.7 Allow test to continue for another 30 minutes after car temp. has reached 70°F.

Note: In-Service Heat Test continued in Item 8.4.

8.3 Layover Heat Test.

8.3.1 Cool car down to 45° approx. Turn off heat and use blowers to accelerate temperature drop. Add refrigeration to chamber.
8.3.2 Switch controls to layover and note time.
8.3.3 Note time and temp. when floor heat comes on.
8.3.4 Note time and temp. when floor heat is shut off.

8.4 In-Service Heat Test Continued.

Heat cold room up thru 35°F to check performance of fresh air thermostat in fresh air duct. When ambient temp. reaches 35°F, 16 KW is to automatically shut off. Record temp. and time when this event takes place.
g. **Air Comfort System (Contd.)**

8.5 Heater Guard Temperatures.

Check temperature of heater guards using thermocouple-type meter.

9. **Air Cooling Test:**

9.1 Soak car for approx. eight hours at 105°F.

9.2 At the start of test, prior to turning on air comfort, record temperatures and relative humidity in car and hot room.

9.3 Turn air comfort on. Record temperatures of hot room and car throughout the test and at times when significant events take place. Also record relative humidity during tests. Significant events take place at:

a) Below 72° air conditioning is off.
b) Between 72° and 74°, 9 KW reheat is energized.
c) Between 72° and 75° partial cool is on.
d) Above 75° full cooling is on.

9.4 Record:

a) When systems cycle to partial cool (75° nominal).
b) Record when car cools to 74°.
c) Record when car cools to 72°.

10. **Electric Load Requirement - Heating:**

Record amperes drawn by:

a) Floor heaters
b) Overhead heaters #1 End 9 KW
c) Overhead heaters #1 End 16 KW
d) Overhead heaters #2 End 9 KW
e) Overhead heaters #2 End 16 KW
f) Cab heater
g) Defroster - no heater
RESULTS: AIR COMFORT SYSTEM

A. Heating Test

1. Thermal capacity determination. Reference 8.0.

Volts 620
Amps 19

Power 11.9 KW

11.9 KW

Temperature car at equilibrium = 63.8°F
Temperature cold room equilibrium = 18.8°F
BTU input = 11.9 x 3413 = 40,000 BTU
Temperature difference = 45°
BTU constant for car = 40,000/45 = 885 BTU/hr/°F/car
Conditions: Blowers off; fresh air vents uncovered
2. In Service Heat Test and Layover Heat Test Results:

<table>
<thead>
<tr>
<th>Event</th>
<th>Ref.</th>
<th>Time</th>
<th>Time Min.</th>
<th>Car at Ret. Air</th>
<th>Cold Room at F. A. Intakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Start of Test</td>
<td>8.2.2, 8.2.3</td>
<td>0830</td>
<td>zero</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>A/C On.</td>
<td>8.2.4</td>
<td>0840</td>
<td>10</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>16 KW 1st Cycle Off</td>
<td>8.2.5</td>
<td>0906</td>
<td>36</td>
<td>61</td>
<td>3</td>
</tr>
<tr>
<td>9KW, 16KW &amp; Floor Heat Off.</td>
<td>8.2.6</td>
<td>1118</td>
<td>168</td>
<td>70</td>
<td>14</td>
</tr>
<tr>
<td>Cab Reached 70°</td>
<td>8.2.7</td>
<td>1148</td>
<td>184</td>
<td>70</td>
<td>16</td>
</tr>
<tr>
<td>Car Cooled</td>
<td>8.3.1</td>
<td>1200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor Heat On</td>
<td>8.3.3</td>
<td>1334</td>
<td>zero</td>
<td>43.5*</td>
<td>12</td>
</tr>
<tr>
<td>Floor Heat Off</td>
<td>8.3.4</td>
<td>1630</td>
<td>176</td>
<td>59</td>
<td>24</td>
</tr>
<tr>
<td>Heated Cold Room up thru 35° 16 KW off</td>
<td>841</td>
<td>1715 #2 End</td>
<td>32-1/2 T #9</td>
<td>32-1/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1812 #1 End</td>
<td>38-1/2 T #6</td>
<td>38</td>
<td></td>
</tr>
</tbody>
</table>

*Thermocouple #6 2nd chart corresponds to #26 exhibit A.
Test Spec.
Air Comfort Sys.

3. Heater Guard Temperatures Results.

Thermostats #23 & #24 were temporarily moved to heater guard for heater guard test.

<table>
<thead>
<tr>
<th>1st Test</th>
<th>2nd Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>#23 &gt; 150° = 190°</td>
<td>#23 &gt; 150°</td>
</tr>
<tr>
<td>#24 &lt; 150°</td>
<td>#24 &gt; 150°</td>
</tr>
</tbody>
</table>

Using contact pyrometer the following results were obtained:

Conclusions April 26, 1973:

Absence of Parallel Air Passage Prohibits Variation of Grille Surface Temp. \( t_1 \)

It is recommended parallel air passages be incorporated in future designs.
Test Spec.

Air Comfort Sys.

B. Results Air Cooling.

<table>
<thead>
<tr>
<th>Event</th>
<th>Ref.</th>
<th>Time</th>
<th>Min.</th>
<th>Car Temp</th>
<th>Hum.</th>
<th>Cold Room Temp</th>
<th>Hum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>At start prior to turning on A/C.</td>
<td>9.2</td>
<td>0830</td>
<td>-</td>
<td>108</td>
<td>39</td>
<td>99</td>
<td>42</td>
</tr>
<tr>
<td>A/C turned on.</td>
<td>9.3</td>
<td>0955</td>
<td>zero</td>
<td>104</td>
<td>40</td>
<td>108</td>
<td>34</td>
</tr>
<tr>
<td>#1 End</td>
<td>9.4a)</td>
<td>1028</td>
<td>33</td>
<td>(ave)</td>
<td>75</td>
<td>60</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>77 (at #7 T)</td>
<td></td>
</tr>
<tr>
<td>#2 End</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(72° thermostat instead of 76° and thus would not shut off. At 1033 error was noticed. When changed over, #2 End immediately went to partial cool.)</td>
<td></td>
<td>1150</td>
<td>115</td>
<td></td>
<td>56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car cooled to 74°F.</td>
<td>9.4b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#1 End</td>
<td>1246</td>
<td>-</td>
<td>T</td>
<td>74.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#2 End</td>
<td>1321</td>
<td></td>
<td>T</td>
<td>74.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Cooling of car was accelerated by turning room heat off and opening a door.)</td>
<td></td>
<td>1414</td>
<td>at T-7</td>
<td>73</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car cooled to 72°F</td>
<td>9.4c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#2 End</td>
<td>1323</td>
<td></td>
<td>T</td>
<td>74.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#1 End</td>
<td>1414</td>
<td>at T-7</td>
<td>73</td>
<td>52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>at T-10 73-1/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At 1320 it was observed the 72° thermostat at #1 End was defective. It was replaced just prior to 1414.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C. **Results**

Current drawn by heaters:

<table>
<thead>
<tr>
<th>Floor Heaters</th>
<th>Volts</th>
<th>Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead 9 KW #1 End</td>
<td>630</td>
<td>18.5</td>
</tr>
<tr>
<td>16 KW #1 End</td>
<td>630</td>
<td>16</td>
</tr>
<tr>
<td>9 KW #2 End</td>
<td>630</td>
<td>27.5</td>
</tr>
<tr>
<td>16 KW #2 End</td>
<td>630</td>
<td>25</td>
</tr>
<tr>
<td>Cab Heater</td>
<td>630</td>
<td>2.25</td>
</tr>
</tbody>
</table>
D. Temperatures in passenger area during heating tests. See Exhibit "A" for thermocouple locations.

<table>
<thead>
<tr>
<th>Return Air at 70° Htr. off at 11:18 Hrs.</th>
<th>Cab reached 70°F at 11:48 Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>70</td>
</tr>
<tr>
<td>16</td>
<td>72</td>
</tr>
<tr>
<td>17</td>
<td>70.5</td>
</tr>
<tr>
<td>18</td>
<td>72</td>
</tr>
<tr>
<td>19</td>
<td>71</td>
</tr>
<tr>
<td>20</td>
<td>69</td>
</tr>
<tr>
<td>21</td>
<td>70</td>
</tr>
<tr>
<td>22</td>
<td>69</td>
</tr>
<tr>
<td>23</td>
<td>70</td>
</tr>
<tr>
<td>24</td>
<td>70</td>
</tr>
<tr>
<td>25</td>
<td>70</td>
</tr>
<tr>
<td>26</td>
<td>70</td>
</tr>
<tr>
<td>7</td>
<td>70</td>
</tr>
<tr>
<td>10</td>
<td>70</td>
</tr>
<tr>
<td>13</td>
<td>--</td>
</tr>
<tr>
<td>14</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: Floor heat thermostat was located on partition and extended into partition. Partition acted as a heat sink. Thermostat has been subsequently remounted in same location in passenger area but isolated from partition.
Test Spec.
Air Comfort Sys.

E. Temperatures in passenger area recorded during cooling tests.

See Exhibit "A" for thermocouple location.

<table>
<thead>
<tr>
<th></th>
<th>Full Cool ON at 1044 hours</th>
<th>Car cooled to 72° at 1414 hours</th>
<th>During Reheat at 1400 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>76</td>
<td>73-1/4</td>
<td>75</td>
</tr>
<tr>
<td>16</td>
<td>76</td>
<td>73</td>
<td>74-1/2</td>
</tr>
<tr>
<td>17</td>
<td>74-1/2</td>
<td>72-1/4</td>
<td>73-1/2</td>
</tr>
<tr>
<td>18</td>
<td>76</td>
<td>73-3/4</td>
<td>75</td>
</tr>
<tr>
<td>19</td>
<td>76-1/2</td>
<td>73</td>
<td>75</td>
</tr>
<tr>
<td>20</td>
<td>75-1/2</td>
<td>73-1/4</td>
<td>75-1/4</td>
</tr>
<tr>
<td>21</td>
<td>76</td>
<td>73</td>
<td>75-1/4</td>
</tr>
<tr>
<td>22</td>
<td>74-1/2</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td>23</td>
<td>75</td>
<td>72-3/4</td>
<td>73-1/2</td>
</tr>
<tr>
<td>24</td>
<td>75</td>
<td>72-3/4</td>
<td>73-3/4</td>
</tr>
<tr>
<td>25</td>
<td>76</td>
<td>73-1/2</td>
<td>75</td>
</tr>
<tr>
<td>26</td>
<td>76</td>
<td>73</td>
<td>75</td>
</tr>
</tbody>
</table>
O = BOTTOM THERMOCOUPLE
O = TOP THERMOCOUPLE

EXHIBIT A
F. Airflow Determination

The ventilation system did not meet the detail specification fresh air requirement of 18 cfm per passenger when tested in its original configuration. This was one of the criteria which led to the selection of the installed system which lists rated flow as 900 cfm fresh air and 1100 cfm recirculated air at each end of the car.

Fresh air flow of less than 100 cfm was measured in the tests of the original configuration on Car No. 1. Total flow was approximately correct, indicating that the blowers were performing satisfactorily. Various intake modifications were investigated. Results are tabulated below.

The first approach was to remove restrictions in the fresh air inlet by removing the stamped louver cover (about 20% open area) and the rain deflectors (5 - 1.5 x .38 angles staggered across the sloping "duct" outlet). This produced less than half the desired fresh air flow but more total flow than required.

Cutting the recirculated air return grille area in half produced the desired total flow but raised fresh air to only 70% of desired. Measurements were then made without the filter with a view to using a thinner filter if indicated to be significant. Fresh air flow was over 80% of desired and might have been maintained with a thin filter by reducing recirculated grille area. However, the acceptability of a thinner filter would require further consideration and the filter was reinstalled.

Since the completely open fresh air openings were considered impractical from the standpoint of ingestion of water and debris, subsequent tests were made with an "egg crate" grille (.032 thick aluminum, .50 inch square pattern, .50 inch deep) installed. This reduced fresh air flow to 55% of desired without a corresponding increase in recirculated flow.

It appeared that the fresh air inlet was restricted by:
(a) the air having to turn about 70° after coming thru the "egg crate" grille; (b) a 1-inch angle at the inboard edge of the roof opening; and (c) the 1.75 inch high dam at the inboard bottom edge of the duct. Triangular holes were cut in both sides of the ducts under the roof opening to alleviate the flow restrictions. These holes were about .25 square foot each but their effectiveness was reduced by the installation of water gutters. Flow measurements indicated this modification just compensated for the "egg crate" grille.
F. Airflow Determination (Contd.)

A horizontal baffle was installed in the intake plenum and tested. This baffle bridges the opening between the ends of the inlet duct and extends to the face of the filter over its full length, thus effectively, although not absolutely, separating the fresh and recirculated airstreams until they reach the blower plenum. This configuration provided the desired fresh air and high total flow with the recirculated air grille fully open. After the desired airflows were obtained with the baffle, the triangular poles in the ducts were closed and a 1-inch thick wire mesh pad was installed on the bottom of the fresh air inlet duct to minimize water splash.

<table>
<thead>
<tr>
<th>Return Air Grille Area Sq.Ft.</th>
<th>Fresh Air CFM</th>
<th>Recirculated AIR CFM</th>
<th>Total CFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) &amp; (2)</td>
<td>5.2</td>
<td>422</td>
<td>1726</td>
</tr>
<tr>
<td>(1) &amp; (2)</td>
<td>2.6</td>
<td>622</td>
<td>1370</td>
</tr>
<tr>
<td>(1) &amp; (2) Repeat</td>
<td>2.6</td>
<td>645</td>
<td>1370</td>
</tr>
<tr>
<td>(1) &amp; (2) Filter Out</td>
<td>2.6</td>
<td>734</td>
<td>1409</td>
</tr>
<tr>
<td>(4) &amp; (2)</td>
<td>2.6</td>
<td>510</td>
<td>1370</td>
</tr>
<tr>
<td>(4), (2) &amp; (3)</td>
<td>2.6</td>
<td>672</td>
<td>1365</td>
</tr>
<tr>
<td>(5), (4), (2) &amp; (3)</td>
<td>5.2</td>
<td>896</td>
<td>1508</td>
</tr>
</tbody>
</table>

Modification Legend
(1) = Outer grille off
(2) = Rain deflectors out
(3) = Triangular Hole (.25 sq.ft.) in each side of duct
(4) = Egg crate grille on
(5) = Horizontal baffle in plenum chamber

*Measured with hot wire annemometer on Car No. 1.
g. AIR COMFORT SYSTEM (Contd.)
(Cold Room)
Test Results

Test Date: **Aug 7 862**

Conclusion:
Heating and cooling systems have satisfactory heating and cooling capacity. **YES**

Test Data:

<table>
<thead>
<tr>
<th>SECTION</th>
<th>INDICATION</th>
<th>TOLERANCE</th>
<th>RECORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Conditioner Test a)</td>
<td>Blower fan #1 &amp; #2 full speed</td>
<td>-</td>
<td>Che</td>
</tr>
<tr>
<td></td>
<td>b) All heat off</td>
<td>-</td>
<td>Che</td>
</tr>
<tr>
<td></td>
<td>c) Both air conditioners at full cool</td>
<td>-</td>
<td>Che</td>
</tr>
<tr>
<td>Relative humidity</td>
<td></td>
<td>-</td>
<td>39%</td>
</tr>
<tr>
<td>a) First stage cooling #1</td>
<td>Below 76°F</td>
<td>77°F</td>
<td></td>
</tr>
<tr>
<td>b) First stage cooling #2</td>
<td>Below 76°F</td>
<td>75°F</td>
<td></td>
</tr>
<tr>
<td>Thermocouple reading</td>
<td>Use recorder</td>
<td>75877°Che</td>
<td></td>
</tr>
<tr>
<td>Balance Temperature</td>
<td>2°F difference in car</td>
<td>73½-75°F</td>
<td></td>
</tr>
<tr>
<td>Volume of air flow</td>
<td>Not less than 4,000 cu. ft. per min.</td>
<td>2063 CFM #</td>
<td></td>
</tr>
<tr>
<td>Air velocity</td>
<td>Not more than 75 ft. per min.</td>
<td>&gt; 75 ft</td>
<td></td>
</tr>
<tr>
<td>Relative humidity</td>
<td></td>
<td>52%</td>
<td></td>
</tr>
<tr>
<td>Reheat cycle #1</td>
<td>Below 74°F</td>
<td>74.5°F</td>
<td></td>
</tr>
<tr>
<td>Reheat cycle #2</td>
<td>Below 74°F</td>
<td>74.5°F</td>
<td></td>
</tr>
</tbody>
</table>
### AIR COMFORT SYSTEM (Contd.)
(Cold Room)

<table>
<thead>
<tr>
<th>SECTION</th>
<th>INDICATION</th>
<th>TOLERANCE</th>
<th>RECORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermocouple readings</td>
<td>Use recorder</td>
<td>( &gt; 4.5 \text{ Ci} )</td>
<td></td>
</tr>
<tr>
<td>Ventilating Cycle #1</td>
<td>Below 71°F</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Ventilating Cycle #2</td>
<td>Below 72°F</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Blower fans at low speed</td>
<td>Use recorder</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Thermocouple readings</td>
<td>Use recorder</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Relative humidity</td>
<td>-</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

### HEATING TEST

**a)** Floor contactor energized

**b)** Overhead contactor #1 & #2 energized

**c)** BF #1 & #2 at low speed

| a) Floor heat current | 18.5 |
| b) Overhead heat #1 current 16 kW | 16 |
| c) Overhead heat #2 current 9 kW | 27.5 |
| d) Cab heat current | 21/4 |

### Heaters off

Thermocouple readings

**Above 59°F**

| Test | 70 |

### LAYOVER HEAT TEST

Floor heat on

Thermocouple readings

**Below 40°F**

| Test | 43.5 |

---

**TESTED BY:** [Signature]

**APPROVED BY:** (Engr) [Signature]

**APPROVED BY:** (Q.A.) [Signature]
## EAST

### NO. 1 END

<table>
<thead>
<tr>
<th></th>
<th>B-SIDE</th>
<th>A-SIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/4</td>
<td>1/16</td>
</tr>
<tr>
<td>1</td>
<td>3/4</td>
<td>3/64</td>
</tr>
<tr>
<td>1</td>
<td>3/4</td>
<td>3/64</td>
</tr>
<tr>
<td></td>
<td>3/4</td>
<td>3/64</td>
</tr>
<tr>
<td></td>
<td>7/8</td>
<td>5/64</td>
</tr>
<tr>
<td>5</td>
<td>3/4</td>
<td>9/64</td>
</tr>
<tr>
<td></td>
<td>63/64</td>
<td>9/64</td>
</tr>
<tr>
<td></td>
<td>63/64</td>
<td>9/64</td>
</tr>
<tr>
<td></td>
<td>15/16</td>
<td>1/8</td>
</tr>
<tr>
<td>45/64</td>
<td></td>
<td>9/64</td>
</tr>
<tr>
<td>3/16</td>
<td></td>
<td>9/64</td>
</tr>
<tr>
<td>3/16</td>
<td></td>
<td>9/64</td>
</tr>
<tr>
<td>13/64</td>
<td></td>
<td>9/64</td>
</tr>
<tr>
<td>3/16</td>
<td></td>
<td>3/32</td>
</tr>
<tr>
<td>1/16</td>
<td></td>
<td>5/32</td>
</tr>
<tr>
<td>1/16</td>
<td></td>
<td>3/32</td>
</tr>
<tr>
<td>3/16</td>
<td></td>
<td>5/64</td>
</tr>
<tr>
<td>11/64</td>
<td></td>
<td>3/16</td>
</tr>
<tr>
<td>1/8</td>
<td></td>
<td>1/16</td>
</tr>
<tr>
<td>1/8</td>
<td></td>
<td>1/16</td>
</tr>
<tr>
<td>1/8</td>
<td></td>
<td>1/8</td>
</tr>
<tr>
<td>1/8</td>
<td></td>
<td>1/8</td>
</tr>
<tr>
<td>1/8</td>
<td></td>
<td>7/64</td>
</tr>
<tr>
<td>1/8</td>
<td></td>
<td>7/64</td>
</tr>
<tr>
<td>11/64</td>
<td></td>
<td>7/64</td>
</tr>
<tr>
<td>5/32</td>
<td></td>
<td>7/8</td>
</tr>
<tr>
<td>1/64</td>
<td></td>
<td>7/8</td>
</tr>
<tr>
<td>1/64</td>
<td></td>
<td>7/8</td>
</tr>
<tr>
<td>1/64</td>
<td>1/64</td>
<td>1 3/4</td>
</tr>
<tr>
<td>1 9/16</td>
<td></td>
<td>1 3/4</td>
</tr>
</tbody>
</table>

### DIFFUSER SETTINGS USED ON RAA

USED AS GUIDE FOR SORC
3.5 MAIN PROPULSION CONTROL AND MOTOR ROTATION

1. Connect 600 VDC source to the car.

2. Place the following circuit breakers on the HVCBP to the position indicated:
   - Motor Alternator Field On
   - Alternator Voltage Regulator On

3. Place the following circuit breakers on the LVCBP to the position indicated:
   - BATT On
   - CC On
   - C On
   - MAC On

4. Turn on the following circuit breakers and switches:
   - Main Light Inverter
   - Cab Light
   - All other LVDC Circuit Breakers
   - Battery Charger
   - Traction Motor Cooling Fan #1; check for function.
   - Traction Motor Cooling Fan #2; check for function.
   - P-Signal Generator
   - Air Conditioner Blower Fan #1
   - Air Conditioner Blower Fan #2
   - Air Conditioner Compressor #1
   - Air Conditioner Compressor #2
   - Air Comfort Switch. Check that air conditioner blower fans function.
   - Brake Air Compressor. Check for function.

5. Turn direction control switch key to "OFF-CHARGE."
   Put controller handle in "FULL SERVICE." Check brake air pressure charge 110 pounds.

6. Push RESET. Turn key to FORWARD. Check SIDE DOORS CLOSED light illuminated.

7. Turn deadman and move handle slowly to "COAST."
   Check P-wire; should read .5. Move handle back to "FULL SERVICE" and release deadman.


9. Turn on TRACTION MOTOR FIELD circuit breaker (HVCBP).

10. Turn deadman and move controller handle to "COAST."
    Check brake cylinder pressure zero.
3.5 MAIN PROPULSION CONTROL AND MOTOR ROTATION (Contd.)

11. Move controller handle to lowest point of power momentarily and check for forward movement.

12. Repeat Item 11 with key in "REVERSE" and check for rearward movement.

13. Turn key to OFF CHARGE and move controller handle to FULL SERVICE.


15. Place the circuit breaker in Item 9 - OFF.

16. Place all switches and circuit breakers in Items 2, 3 and 4 - OFF.

17. Disconnect 600 VDC source from the car.
MAIN PROPULSION CONTROL & MOTOR ROTATION

TEST RESULTS

TEST DATE: 8-22-72  

CONCLUSION:

1. Propulsion System Operation Correct
   YES

2. Motor Rotation Correct YES

TEST DATA:

1. Direction of Car Movement when Master Controller Key 
is in Forward Position and Control Handle is in Power
   Position FORWARDED

2. Direction of Car Movement when Master Controller Key
   is in Reverse Position and Control Handle is in Power
   Position REVERSE

TESTED BY: GARRETT F.W.C  
DATE: 8-22-72

APPROVED BY (ENGR.)  
DATE: 8-22-72

APPROVED BY (Q.A.):  
DATE: 8-22-72
MAIN PROPULSION CONTROL & MOTOR ROTATION

TEST RESULTS

TEST DATE: 8-24-72       CAR #  2

CONCLUSION:

1. Propulsion System Operation Correct ________________ yes

2. Motor Rotation Correct ________________ yes

TEST DATA:

1. Direction of Car Movement when Master Controller Key
   is in Forward Position and Control Handle is in Power
   Position ________________________________ Forward

2. Direction of Car Movement when Master Controller Key
   is in Reverse Position and Control Handle is in Power
   Position ________________________________ Reverse

TESTED BY: GARRETT ENGR.       DATE: 8-24-72

APPROVED BY (ENGR.):       DATE: 8-24-72

APPROVED BY (Q.A.):       DATE: 8-24-72
3.6 BRAKING

1. Connect 600 VDC source to the car.

2. Place the following circuit breakers on the HVCBP to the position indicated:
   - Motor Alternator Field: On
   - Alternator Voltage Regulator: On

3. Place the following circuit breakers on the LVCBP to the position indicated:
   - BATT: On
   - CC: On
   - C: On
   - MAC: On

4. Turn on the following circuit breakers and switches:
   - Main Light Inverter
   - Cab Light
   - All other LVDC Circuit Breakers except 1, 2 & 6
   - Battery Charger
   - Traction Motor Cooling Fan #1
   - Traction Motor Cooling Fan #2
   - P-Signal Generator
   - Air Conditioner Blower Fan #1
   - Air Conditioner Blower Fan #2
   - Air Conditioner Compressor #1
   - Air Conditioner Compressor #2
   - Air Comfort Switch
   - Brake Air Compressor. Check for function.

   Note: All charging and "P" signal circuits need to be energized and air system charged for full service operation. DO NOT TURN ON TRAINLINE CIRCUIT BREAKERS.

5. Turn direction control switch key to "OFF-CHARGE." Put controller handle in "FULL SERVICE." Check brake air pressure charge 110 pounds.

6. Make main brake system checks as required by test data sheet.

7. Make emergency brake system checks as required by test data sheet.

8. Deleted.
9. Make snow brake checks in accordance with steps 10 through 13.

10. Turn on snow brake circuit breaker to provide battery energy to snow brake console switch.

11. Move master controller handle until P-signal is greater than .5 amps on P-signal meter.

   Observe and record the following: At greater than .5 amps P-signal, brake cylinder pressure should be 0 psi.

12. Turn snow brake switch at console to ON position. Observe and record the following:

   a) Observe that P-signal is steady at .5 amps or greater.
   b) Snow brake indicator light on console is illuminated and brake cylinder pressure gauge at console should read 5-8 lbs. psi.
   c) Air gauge at #1 and #2 truck should read 5-8 psi brake cylinder pressure.
   d) Check that brake shoes on #1 and #2 trucks are touching the wheels.

13. Turn snow brake switch at console to OFF position. Observe and record the following:

   a) Snow brake indicator light is not illuminated.
   b) Brake cylinder pressure on console gauge should read 0 psi.
   c) Air pressure at #1 and #2 truck gauges should read 0 psi.
   d) Brake shoes should pull clear of #1 and #2 truck wheels.


15. Place all switches and circuit breakers in Items 2, 3 & 4 - OFF.

16. Disconnect 600 VDC source from the car.
MAIN BRAKE/EMERGENCY BRAKE

Test Results

Test Date: 8/22/72  Car #: 1

Conclusion:

1. There are no leaks (piping) in pneumatic system  YES
2. Main reservoir pressure adequate  YES

Test Date:

1. Time for compressor to build main reservoir pressure
   (0 to Modulate)  4 min 42 seconds
2. Compressor modulation  132 psi cut-in
   148 psi cut-out
3. Leak test - air  4 psi/min.
4. Brake cylinder pressure:
   #1 End Full Service  63 psi
   #1 End Release Time  2 sec.
   #1 End Apply Time  1.8 sec.
   #2 End Full Service  62 psi
   #2 End Release Time  1.5 sec.
   #2 End Apply Time  1.5 sec.

   a.) Brake cylinder pressure at simulated heavy car (CW2) and empty car with a mid brake command.

   #1 End CW2  40 psi  E.C. 31 psi
   #2 End CW2  4.5 psi  E.C. 3.5 psi
MAIN BRAKE/EMERGENCY BRAKE

Test Results (Cont'd.)

5. Trip Cock Functions:

   Car goes into emergency  ✓  yes  no
   Trip cock automatically resets  ✓  yes  no

6. Emergency Valve Functions:

   Car goes into emergency  ✓  yes  no

7. Dead Man Functions:

   Car goes into full service brake with handle release  ✓  yes  no

8. Emergency Brake Cylinder Pressure

   #1 End  68  psi
   #2 End  65  psi
   Time to recharge  38  sec.

TESTED BY:  [Signature]  DATE:  8/23/72

APPROVED BY (ENGR.):  [Signature]  DATE:  8/22/72

APPROVED BY (Q.A.):  [Signature]  DATE:  8-22-72
MAIN BRAKE/EMERGENCY BRAKE

Test Results

Test Date: 8/24/72 Car # 2

Conclusion:

1. There are no leaks (piping) in pneumatic system YES

2. Main reservoir pressure adequate YES

Test Date:

1. Time for compressor to build main reservoir pressure
   (0 to Modulate) 4 min 33 seconds

2. Compressor modulation
   130 psi cut-in
   153 psi cut-out

3. Leak test - air
   5 psi/min.

4. Brake cylinder pressure:
   #1 End Full Service 61 psi
   #1 End Release Time 2.0 sec.
   #1 End Apply Time 1.8 sec.
   #2 End Full Service 55 psi
   #2 End Release Time 2.0 sec.
   #2 End Apply Time 1.5 sec.

5. Brake cylinder pressure at simulated heavy car (CW2) and empty car with a mid brake command.

   #1 End CW2 __ psi E.C. __ psi
   #2 End CW2 __ psi E.C. __ psi

Not able to perform
**MAIN BRAKE/EMERGENCY BRAKE**

**Test Results (Cont'd.)**

5. **Trip Cock Functions:**
   - Car goes into emergency: yes
   - Trip cock automatically resets: yes

6. **Emergency Valve Functions:**
   - Car goes into emergency: yes

7. **Dead Man Functions:**
   - Car goes into full service brake with handle release: yes

8. **Emergency Brake Cylinder Pressure**
   - #1 End: 65 psi
   - #2 End: 65 psi
   - Time to recharge: 36 sec.

**Tested By:** John Johnson  
**Date:** 8/24/72

**Approved By (Engr.):** William Kennedy  
**Date:** 8/25/72

**Approved By (Q.A.):** J. R.  
**Date:** 8/24/72
SNOW BRAKING

Test Results

Test Date: 12/18/72  Car # 1

Conclusions:

1. Snow brake operated independently from "P" signal

Test Data:

1. Cylinder Pressure:

   A End 8 PSI.
   B End 8 PSI.

 Tested By: TOM WATSON (E.26)  Date: 12/18/72

Approved By (Engr.):  Date: 12/18/72

Approved By (Q. A.):  Date: 12/18/72
SNOW BRAKING (Contd.)

Test Results

Test Date: 12/18/72  Car # FFZ

Conclusions:

1. Snow brake operated independently from "P" signal

Test Data:

1. Cylinder Pressure:
   A End __________ PSI.
   B End __________ PSI.

Tested By: TOM WEST  Date: 12/18/72

Approved By (Engr.):  Date: 12/18/72

Approved By (Q.A.):  Date: 12/18/72
3.6 BRAKING (Contd.)

Hand Brake Operation

1. Place the following circuit breakers on the LVCBP to the position indicated:

   \begin{align*}
   \text{HB} & \quad \text{On} \\
   \end{align*}

2. Manually operate the hand brake until M/M's hand brake indicator comes ON.

3. Observe and record the following:
   \begin{enumerate}
   \item[a)] Hand Brake Indicator - Illuminated (on M/M's console)
   \item[b)] There is no contact between the brake shoe and the wheel.
   \end{enumerate}

4. On test box R-44-1C-2 observe and record:
   \begin{align*}
   \text{L2-19} & \quad \text{Illuminated} \\
   \text{R2-19} & \quad \text{Illuminated} \\
   \end{align*}

5. On test box R-44-1C-1 observe and record:
   \begin{align*}
   \text{L2-19} & \quad \text{Illuminated} \\
   \text{R2-19} & \quad \text{Illuminated} \\
   \end{align*}

6. Manually operate the hand brake to the OFF position.

7. On the motorman's console observe and record:

   \begin{align*}
   \text{Hand Brake Indicator} & \quad \text{Off} \\
   \end{align*}

8. On test box R-44-1C-2 observe and record:
   \begin{align*}
   \text{L2-19} & \quad \text{Off} \\
   \text{R2-19} & \quad \text{Off} \\
   \end{align*}

9. On test box R-44-1C-1 observe and record:
   \begin{align*}
   \text{L2-19} & \quad \text{Off} \\
   \text{R2-19} & \quad \text{Off} \\
   \end{align*}

10. Place the following circuit breakers on the LVCBP to the position indicated:

    \begin{align*}
    \text{HB} & \quad \text{Off} \\
    \end{align*}
HAND BRAKE

Test Results

Test Date: __8-12-72__ Car # __1__

Conclusion:

1. Handbrake functions properly __yes__

Test Data:

1. Number of pumps for full service application __20__

2. Number of pumps for full release __19__

3. Force to move car with handbrake set __20__ lbs

Tested By: __[Signature]__ Date: __9/2/72__

Approved By (Engr.): __[Signature]__ Date: __9-12-72__

Approved By (Q.A.): __[Signature]__ Date: __9-12-72__
HAND BRAKE (Contd.)

Test Results

Test Date: 8-21-72

Car # 2

Conclusion:

1. Handbrake functions properly Yes

Test Data:

1. Number of pumps for full service application 19

2. Number of pumps for full release 12

3. Force to move car with handbrake set: ___ lbs.

Tested By: Thomas Yost

Date: 8-21-72

Approved By (Engr.): T. Keene

Date: 8-21-72

Approved By (Q.A.): L.D. Reed

Date: 8-21-72
3.7 PROPULSION AUXILIARIES

1. Start motor alternator.

2. Check air flow at exhaust, by hand.

3. Check frequency of AC output of M-A to determine speed.

4. Measure pressure drop at inlet to motor (6" approx.).

5. Turn M-A off and observe that load shed contactor releases before the M-A revs down. On startup, observe M-A begins to rev up prior to load shed contactor pulls in. Observe that load shed contactor does pull in.

6. Check traction motor cooling air pressure.
 PROPULSION AUXILIARIES (Cont'd.)

Test Results

Test Date: 2-7-73  Car # 1

Conclusion:

1. There is sufficient cooling air to the motor alternator  **YES**
2. There is sufficient cooling air to the traction motors  **YES**

Test Data:

1. Motor Alternator starts properly  **YES**
2. Motor Alternator load sheds properly  **YES**
3. Motor Alternator cooling air pressure  **NOT MEASURED** psi
4. Traction Motor cooling air pressure
   
   #1  6.3-6.4 psi
   #2  6.3-6.4 psi
   #3  6.3-6.4 psi
   #4  6.3-6.4 psi.

Tested By:  W. CURRAN  Date:  2-7-73 APPRO

Approved By(Engr.)  W. CURRAN  Date:  2-7-73

Approved By(Q.A.)  Date:  

**MODIFIED FANS WERE INSTALLED**

**2-7-73 PRESSURE TESTS WERE CONDUCTED WITH MODIFIED FANS W. CURRAN**
PROPULSION AUXILIARIES (Contd.)

Test Results

Test Date: 2-9-73   Car # 2

Conclusion:
1. There is sufficient cooling air to the motor alternator <YES>
2. There is sufficient cooling air to the traction motors <YES>

Test Data:
1. Motor Alternator starts properly <YES>
2. Motor Alternator load sheds properly <YES>
3. Motor Alternator cooling air pressure NOT MEASURED psi
4. Traction Motor cooling air pressure
   #1 6.3 - 6.4 psi
   #2 6.3 - 6.4 psi
   #3 6.3 - 6.4 psi
   #4 6.3 - 6.4 psi.

Tested By: W. CURRAN  Date: 2-9-73

Approved By(Engr.) W. CURRAN  Date: 2-9-73

Approved By(Q.A.)  Date:  

MODIFIED FANS WERE INSTALLED 2-9-73
PRESSURE DROP CONDUCTED WITH MODIFIED FANS.

W. CURRAN
3.8 CAR WEIGHT

1. Move complete car onto scale.

2. Center #1 truck with center of scale. Read and record when beam is balanced.

3. Center #2 truck with center of scale. Read and record when beam is balanced.
CAR WEIGHT (Contd.)

Test Results

Test Date: 8-28-72  Car # 1

Test Data:

Weight #1 End  44740 lbs.
Weight #2 End  43560 lbs.
Total Weight  88320 lbs.

Tested by:  JIM  PORTER  Date: 8-28-72

Approved by (Engr.)  Date: 8-28-72

Approved by (Q.A.)  Date: 8-28-72
CAR WEIGHT (Contd.)

Test Results

Test Date: 8-28-72

Test Data:

Weight #1 End 45140 lbs.

Weight #2 End 43940 lbs.

Total Weight 89080 lbs.

Tested by: JIM PORTER

Approved by (Engr) THOMAS

Approved by (Q.A.) L.D. REED

Date: 8-28-72

Date: 8-28-72

Date: 8-28-72
## CAR WEIGHTS - SOAC

<table>
<thead>
<tr>
<th>Description</th>
<th>HDC</th>
<th>LDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Weight at St. Louis Car</td>
<td>88,320#</td>
<td>89,080#</td>
</tr>
<tr>
<td>Pantograph Scale Weight, March 15, 1973</td>
<td>775#</td>
<td>775#</td>
</tr>
<tr>
<td>*Equipment Brackets added at Pueblo</td>
<td>320#</td>
<td>320#</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>169#</td>
<td>114#</td>
</tr>
<tr>
<td>Light Weight at Rail Ready to Run</td>
<td>89,584#</td>
<td>90,289#</td>
</tr>
<tr>
<td>Lead Bars (HDC 328) (LDC 313)</td>
<td>15,416#</td>
<td>14,711#</td>
</tr>
<tr>
<td>AW1</td>
<td>105,000#</td>
<td>105,000#</td>
</tr>
</tbody>
</table>

*Equipment Brackets - estimated weight.

HDC and LDC were loaded to AW1 night of March 13, 1973.
PANTOGRAPH:

1. Before raising pantograph tie the bow so that the maximum rise is 10 ft.

2. Adjust the main spring assembly so that the lifting force measured at the bow is 20-23 lbs. All main springs must be the same length ± 1/4".

3. If the lifting force varies more than 2 lbs. over the entire range, readjust the spring yokes.

4. Turn pantograph switch on console to UP and adjust the rise time to 5-6 seconds. Turn pantograph switch on console to DOWN and adjust the lower time to 4-5 seconds.

Test Results

Test Date: 7-21-72

Conclusions:

Test Data:

1. Lifting force measured at bow: 18 pounds

2. Time to rise, from 0-10 feet: 5.3 seconds

3. Time to lower, from 10-0 feet: 4.5 seconds

Tested by: [Signature]
Date: 7-31-72

Approved by (Engr.): [Signature]
Date: 7-31-72

Approved by (QA): [Signature]
Date: 7-31-72

Car Number: 1
PANTOGRAPH:

1. Before raising pantograph tie the bow so that the maximum rise is 10 ft.

2. Adjust the main spring assembly so that the lifting force measured at the bow is 20-23 lbs. All main springs must be the same length ± 1/4".

3. If the lifting force varies more than 2 lbs. over the entire range, readjust the spring yokes.

4. Turn pantograph switch on console to UP and adjust the rise time to 5-6 seconds. Turn pantograph switch on console to DOWN and adjust the lower time to 4-5 seconds.

Test Results

Test Date: 8-10-72

Conclusions:

Test Data:

1. Lifting force measured at bow: 18 LBS
2. Time to rise, from (10) feet: 5.8 SEC
3. Time to lower, from (10) feet: 4.25 SEC

Tested by: Thomas West

Date: 8/10/72

Approved by (Engr.):

Date: 8-10-72

Approved by (OA):

Date: 8-10-72
PANTOGRAPH:

1. Before raising pantograph tie the bow so that the maximum rise is 9\(\frac{1}{2}\) ft.

2. Adjust the main spring assembly so that the lifting force measured at the bow is 20-25 lbs. All main springs must be the same length \(\pm \frac{1}{4}\)".

3. If the lifting force varies more than 2 lbs. over the entire range, readjust the spring yokes.

4. Turn pantograph switch on console to UP and adjust the rise time to 5-6 seconds. Turn pantograph switch on console to DOWN and adjust the lower time to 4-5 seconds.

Test Results

Test Date: \textbf{7-31-72} 

Conclusions:

Test Data:

1. Lifting force measured at bow: \textbf{18 POUNDS}
2. Time to rise: \textbf{5.3 SECONDS}
3. Time to lower: \textbf{4.5 SECONDS}

Tested by: \textbf{Nick Gravany} 

Approved by (Engr.): \textbf{Jeffery} 

Approved by (QA): \textbf{0}

Data re-verified at Pueblo test site after pantograph modification, \textbf{2-3-72}
PANTOGRAPH:

1. Before raising pantograph tie the bow so that the maximum rise is 10 ft.

2. Adjust the main spring assembly so that the lifting force measured at the bow is 20 lbs. All main springs must be the same length ± 1/4".

3. If the lifting force varies more than 2 lbs. over the entire range, readjust the spring yokes.

4. Turn pantograph switch on console to UP and adjust the rise time to 5-6 seconds. Turn pantograph switch on console to DOWN and adjust the lower time to 4-5 seconds.

Test Results

Test Date: 8-10-72  Car Number: 2

Conclusions:

Test Data:

1. Lifting force measured at bow: 18 LBS
2. Time to rise. from (10) feet: 5.8 Sec
3. Time to lower. from (10) feet: 4.25 Sec

Tested by: [Signature]  Date: 8/10/72

Approved by (Engr.): [Signature]  Date: 8-10-72

Approved by (QA): [Signature]  Date: 8-10-72

Data Re-verified at Robbins Test Site after Photo Modication: 4/11/73
AIR COMPRESSOR (Cont'd.)

Test Results

Test Date: 8/24/72

Conclusion:

1. Air compressor has sufficient capacity

Test Data:

1. Time for compressor to recharge system after four (4) successful brake applications reads 140 psi, seconds.

2. Main Reservoir air pressure after one (1) brake cylinder hose has been disconnected and brakes applied once 140 psi.

Tested By: John J. Jackson

Approved By (Engr.) J. Keeney

Approved By (Q.A.) D. Red

Date: 8/24/72

Date: 8/25/72

Date: 8-24-72
3.11 HOSTLING PANEL

1. Place motorman's controller in "Emergency Brake" position and remove console key.

2. Plug hostler in hostler connector.

3. Brake system should charge in approximately 35 seconds.

4. Select "Forward" position:
   a) Push "GO" button and observe car moving forward.
   b) Remove hand from "GO" button and observe braking.
   c) Push "GO" button and after car is moving forward push "Coast" button and observe that car continues to coast.
   d) Remove hand from "Coast" button and observe braking.

5. Repeat in "Reverse" position.

6. Uncouple and recouple using hostler.
HOSTLING PANEL (Cont'd.)

Test Results

Test Date: 3/8/73 Car #: 102

Item 4. "Forward" Position:

4-a) Car moved forward when "Go" button was pressed.
4-b) Car braked when "Go" button was released.
4-c) Car continued to move forward without braking.
4-d) Car braked when "Coast" button was released.

Item 5. "Reverse" Position:

5-a) Car moved backward when "Go" button was pressed.
5-b) Car braked when "Go" button was released.
5-c) Car continued to move backward without braking.
5-d) Car braked when "Coast" button was released.

Item 6. Car uncoupled and coupled satisfactorily using hostler

Tested By: W. CURRAN Date: 3/8/73

Approved By (Engr.) W. CURRAN Date: 3/8/73

Approved By (Q.A.) Date: 
3.12 VISUAL

1. After the car has been completed and all testing has been completed, the car should be checked for the following:

   a) No loose screws, bolts or nuts.

   b) No flaws, mismatch, or tears which could cause passenger injury.

   c) No paint chips or flaws.

   d) No dents or flaws which detract from the good appearance of the car.

   e) All trim fitted in a workmanlike manner.

   f) Floors, windows, doors and side panels clean and without mars or scratches.

   g) No bare metal except stainless steel or aluminum.

   h) No cracks or flaws in fiberglass seats or panels.

   i. Debris.
Test Results

Test Date: 8-28-72

Car # 1

Conclusion:

1. Car is complete and satisfactory for shipment.

YES

Tested By: ____________________________ Date: ____________

Approved By (Engr.): __________________ Date: ____________

Approved By (O.A.): __________________ Date: ____________

Date: 8-28-72
VISUAL (Contd.)

Test Results

Test Date: 8-28-72  Car #: 2

Conclusion:

1. Car is complete and satisfactory for shipment.

   YES

Tested By: ___________________________  Date: ____________

Approved By (Engr.): ___________________________  Date: ____________

Approved By (Q.A.): ___________________________  Date: ____________

Date: 8-28-72
4. CONCLUSIONS

Subsystem functional tests were conducted by the car manufacturer, St. Louis Car Division, General Steel Industries, generally prior to delivery of the SOACs to HSGTC, Pueblo, Colorado.

All subsystems met specification requirements as attested by signed data sheets. Data sheets are not available for the car clearance check and the windshield wiper check.

The ventilation system required modification to meet the fresh airflow requirements.

The floor heat thermostat was remounted to provide proper isolation from the sidewall.

Floor heater guard temperatures exceeded the design goal of 150°F.