AMTRAK
SPECIFICATION #D-77-27

COVERING APPLICATION
OF ELECTRIC MARKER LIGHTS
FRA APPROVED

APPROVED BY

DATE

Rev. A 4/19/78
1. Scope

This specification covers the application of incandescent electric marker lights on Amtrak Conventional Railroad passenger cars, to meet the Federal Railroad Authorization Act of 1976, Public Law 94-348. Amfleet and Superliner cars meet the requirements.

2. Description

This unit is to be used on the rear end of a train as a highly visible marking device.

3. Requirements

Marker device is required to have the following minimum requirements:

(a) Marker device to have an intensity of not less than 100 candela nor more than 1,000 candela as measured at the center of the beam in accordance with Section 4.

(b) A horizontal beam with a minimum arch width of fifteen (15) degrees each side of the vertical center line, and a vertical beam with a minimum arc width of five (5) degrees each side of the horizontal center line as defined in terms of the 50 candela intensity points.

(c) A color defined by the red-orange-amber color range those colors defined by chromaticity coordinates, as expressed in terms of the International Commission on Illumination's 1931 Colormetric System, which lie within the region bounded by the spectrum locus and lines defined by the following equations:

\[ x + y = .97 \quad \text{(white boundary)} \]
\[ y = x - .12 \quad \text{(green boundary)} \]

(d) Minimum 5 inch diameter lens.

(e) Minimum power requirement (watts)

<table>
<thead>
<tr>
<th>Color</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>red or red-orange</td>
<td>20</td>
</tr>
<tr>
<td>yellow or orange</td>
<td>10</td>
</tr>
</tbody>
</table>

4. Minimum Test Requirements

(a) The intensity measurements shall be made with the device mounted in its normal operating position at a distance of 25 feet from the device. Measurements shall be made under dark conditions.

(b) Intensity (of effective intensity) measurements shall be made at points A, B, C, D, E, F, G, H and I as specified in Table 1.
TABLE 1 - Test Points

<table>
<thead>
<tr>
<th>Test Point</th>
<th>Distance from Device (ft.)</th>
<th>Location (deg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Vertical</td>
</tr>
<tr>
<td>A</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>D</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>E</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>F</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>G</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>H</td>
<td>25</td>
<td>-5</td>
</tr>
<tr>
<td>I</td>
<td>25</td>
<td>+5</td>
</tr>
</tbody>
</table>

(c) Intensity shall be at least 100 and not more than 1000 candella at point D and a minimum of 50 candella at points A, B, C, E, F, G, H and I. Table 2 shows the relationship between candella and foot candles at 25 feet from the light source for a steady burning light.

TABLE 2 - Candella - Foot Candle Relationship at 25 feet from Source

<table>
<thead>
<tr>
<th>Candella</th>
<th>Foot Candles</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>.08</td>
</tr>
<tr>
<td>100</td>
<td>.16</td>
</tr>
<tr>
<td>200</td>
<td>.32</td>
</tr>
<tr>
<td>300</td>
<td>.48</td>
</tr>
<tr>
<td>400</td>
<td>.64</td>
</tr>
<tr>
<td>500</td>
<td>.80</td>
</tr>
<tr>
<td>1000</td>
<td>1.60</td>
</tr>
</tbody>
</table>

3
5. **Amtrak Approved Lamps and Fixtures**

   a) Lamp GE 60 PAR/2/R 60 Watt, 38 volt, PAR 46 or equal.

   b) Fixtures
   
   - Translite #FC-3895 (Re-lamp from inside of car)
   - Luminator #0101890-001 (Re-lamp from outside of car)

Fixtures are of different design and should be selected according to car construction etc. Both fixtures accept the GE 60 PAR/2/R Lamp.

6. **Application**

Existing marker lights that do not meet FRA requirements are to be replaced.

On cars not presently equipped with approved marker lights, AMTRAK approved marker lights are to be installed at an area approximately 120" from the top of rail and approximately 45" from each side of the centerline of the car. (Two lights at each car end)

A separate switch to control each end of car is to be provided.

A voltage dropping resistor is required for each lamp on 64 and 110 volt systems. The resistors are to be adjusted to provide 35 volts at the lamps when the battery charging system is normally operating.

Resistor to be ward Leonard type 130, 30 ohm, 100 Watt, Type #805 with adjustable slide #604 (or equivalent) (2 resistors per bracket, 2 brackets per car, to be used on 64 volt system)

On 110 volt cars the use of 2 of the above resistors connected in series for each marker light is required.

Cars to be selected for this modification must have the authorization of the Chief Mechanical Officer.
Set slider for 35 volts at lamp with 76 volt source.

Ward Leonard #130
30 ohm 100 watt
Type # 305 Resistor
(Use 2 per lamp on 110 volt cars)

GE 60 PAR/2/R
60 watt 38 volt
Lamp

RESISTORS NOT REQUIRED ON 32 VOLT CARS.

SK-A-120177
TYPICAL MARKER LIGHT WIRING
NOTE

LOCATION C.B. IN ELECTRIC
LOCATIONS AND D.R.D.T.
SWITCH IN VESTIBULE
APPLY PERMANENT
TYPE LABELS.
VESTIBULE LIGHTS

NOTE

VESTIBULE CARS TO BE MARKED "VESTIBULE AND MARKER LIGHTS TO BE ON AT ALL TIMES."

GE. CATALOG LAMPS

MARKER LIGHTS

ON-OFF

SWITCHES LOCATED IN VESTIBULE WITH PERMANENT LABEL APPLIED

MIN. RATING

5A

D.C.

RESISTOR NOT REQUIRED

MINUS VOLTAGE APPLY

EXISTING WIRING MUST BE VESTIBULE OR DUMMY END LIGHTS ONLY, MINIMUM 12 AWG.

SK-A-120177-2

REFER SPEC D-77-27
1. Return to Marking Specifications 0-17

2. Replace markers lights that do not move in all lamps. Go for 1/4.

3. From top, remove marker lights.

4. For high level signal, luminaire reassembly.

Select markers fixture according to CAN construction:

- (f) Transverse, PN-3951. (Plated Outside)
- (g) Luminaires, PN-3980-0.1 (Plating Outside)

The 45" dimension Min. 120. Max. 130. The 120" dimension Min. 100.

Car construction. Etc., and can be varied because of dimensions are approximate.

Show on this sketch. Those not have markers located are existing location. If car does not locate new marker lights in 5. Locate new marker lights in SK-A-10-177.

For wiring, refer to SK-A-10-177.

Notes:
- GR. APPLICATION
- MARKER LIGHTS
- SK-A-050378

Construction does not permit flush.
- (a) Exterior Box Acceptance: If the G. Cover & Inlets

Flush Mounting.