ELECTRO-MOTIVE
General Motors Corporation

Electro-Motive Division General Motors Corporation, La Grange, Illinois 60525 (708) 387-6000

February 15, 1999

Re: LOCOMOTIVE SPEED SENSOR OPERATORS MANUAL

Electro-Motive Division (EMD) does not issue an operators manual for the locomotive speed sensor assembly (EMD part number 40081692). The speed sensor is an integral part of the locomotive control system. The customer does not have control of its functions.

Engineering Apparatus Instruction # 2458 describes how the assembly is to be mounted on the locomotive. This is used internally for designing the application on various locomotive models. Also, the customer uses this document for repair, if the mounting is damaged. If the speed sensor is inoperative or fails the internal test, it is returned to EMD for factory repair, no information is supplied to the customer for repairing the speed sensor.

Thomas A. Opeka
Senior Experimental Engineer

Feb. 17, 1999

To: Sue Becker

Phone - 651-638-0297
FAX - 651-638-0298

From: Tom Opeka Tom

Phone - 708-387-5642
FAX - 708-387-5460

Attached is the Apparatus Instruction 2458 for the Locomotive radar assembly submittals.

ISSUED BY
J. Pachicano

APPROVED BY
T.J. Coari

ENGINEERING
APPARATUS INSTRUCTIONS

ELECTRO-MOTIVE DIVISION
General Motors Corporation
LaGrange, Illinois

NUMBER
2458

FIRST ISSUED
February 11, 1993

SUPERSEDES

SUBJECT	**K-Band Radar Application**
AFFECTS MODELS	Super Series Locomotive
PART NOS AFFECTED	40034353 40076989 40081692 40034900 40037507
REF. DRAWINGS	

Background

It is crucial to the radar application that the transceiver be mounted at 37.5° with respect to the rail. Any error in the mounting angle will result in about 1.75 percent radar speed error for every degree of mounting error. Any angle error will be significant because the Super Series System is trying to control wheel slip to less than 5 percent.

For this reason, it is necessary for initial application in the upside-down position to be 37.5° +/- 25° with respect to the underframe. At Locomotive Test, in most cases it is expected that the angle of the finished bracket of a complete locomotive will still measure 37 5° +/-25° with respect to the rail without further adjustment.

Radar Mounting Instructions

The radar transceiver assembly must be positioned at 37 5° +/- 25° angle to the rail. After the locomotive is assembled and resting on its own trucks, check the angle of the radar mounting plate and bracket assembly with respect to the rails. If the bracket is not within the specified angle, loosen the four bolts, correct the angle and retighten the bracket to the specified torque (15 +/- 1 ft-lbs)

When the angle has been set, proceed with illustrations as shown on the application drawing, namely: Drive the dowel into the bracket, position drilling pad over the dowel, and weld the dowel to the pad and the pad to the plate.

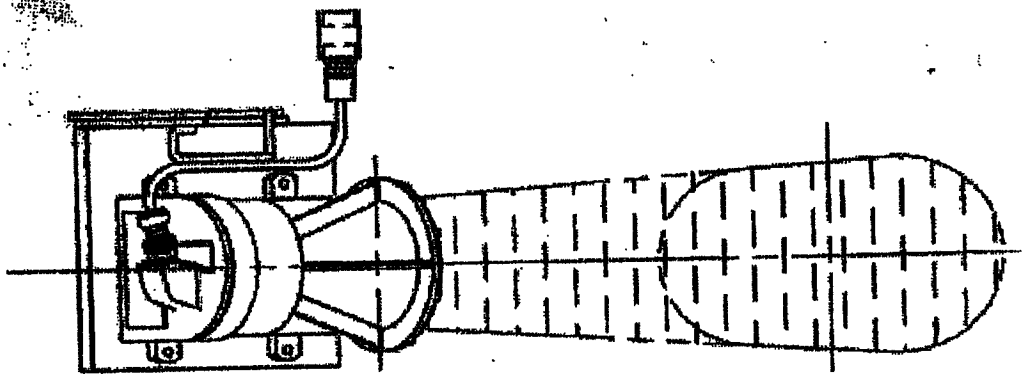
REV	DATE	RFC	PAGES AFFECTED	CHANGED BY	APPROVED BY
A	9/30/93	D46101	2	T. Litak	T. Coari
B	2/4/99	D59745	1	H. Monga	T. Coari

Ensure that the connector is fitted with its rubber O-ring and then connect the plug to the radar assembly Note that cushioned-jaw connector pliers may be required to complete the bayonet locking action. Mount the connected radar assembly to the bracket with specified 1/4-20 mounting bolts to 7 +/- 1 ft-lbs. Use three evenly spaced wire ties to secure the cable to the bracket tie-bar.

Mounting Height and Bracket Location

The mounting height and location of the bracket are critical to the operation of the radar. If the radar is mounted too close to the rail then it becomes susceptible to physical damage. If it is mounted too high, then the distance to the target will increase as will the possibility of interference by moving objects. The following criteria must be followed for determining the mounting height and the bracket location, deviations from theme guidelines require the approval of the engineer responsible for radar.

1. In order to minimize physical damage, the radar must be located at least 1 inch above the bottom of the endplate.
2. The mounting height must be no less than seven inches and no more than 15 inches. This measurement is taken from the top of the rail to the center of the radar lens as shown on figure 1.
3. There is a beamspread associated with the radar. This creates an area that must be kept free of obstructions. Any moving or even stationary object in the path of the radar beam will be detrimental to performance. Note that as the mounting height increases so does the area illuminated by the radar, refer to figure 1.
4. The ideal location of the bracket is near the center of the locomotive. If it is necessary to place it off center then a clearance study must be done. The study must verify that as the locomotive turns, there will be no interference with the radar beam by objects such as the rail or traction motor cables.



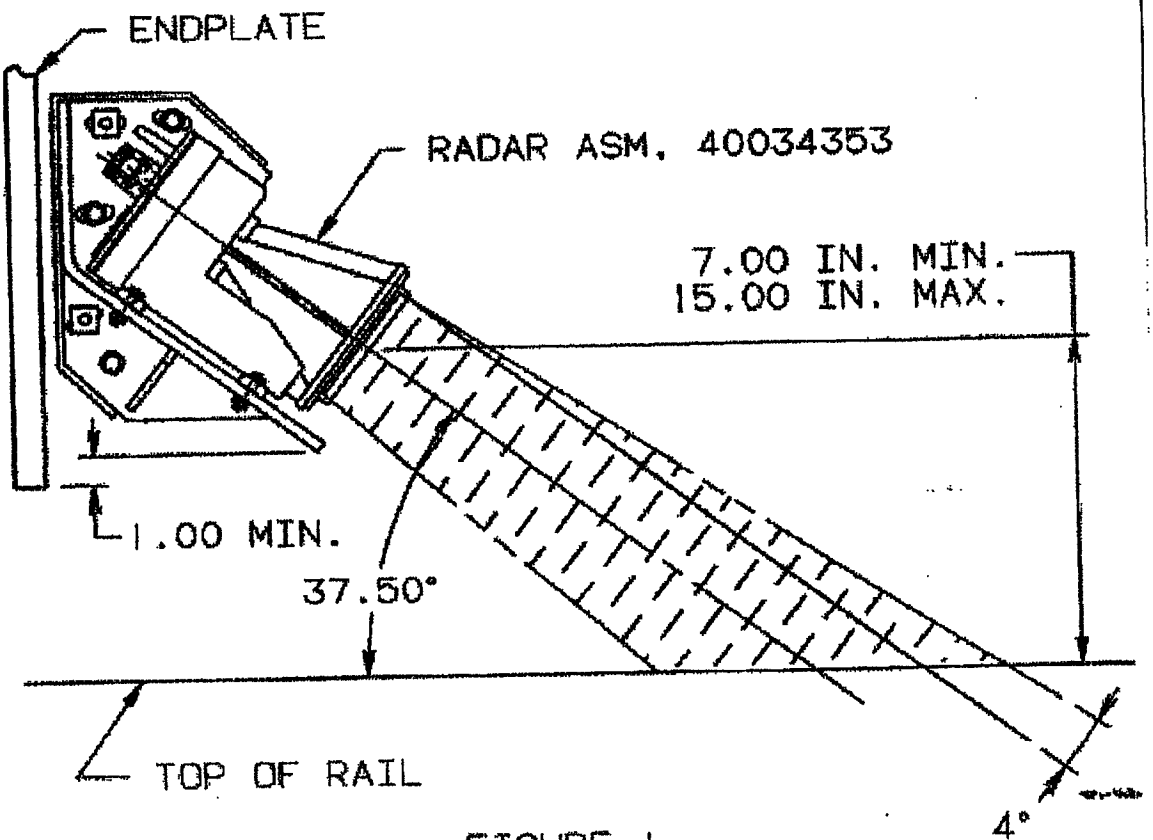

ENDPLATE
RADAR ASM. 40034353
7.00 IN. MIN.
15.00 IN. MAX.
1.00 MIN.
37.50°
TOP OF RAIL
4°

FIGURE 1