RAILROAD ACCIDENT INVESTIGATION

Report No 4042

THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY

HODGE, CALIF

FEBRUARY 27, 1965

INTERSTATE COMMERCE COMMISSION

Washington

SUMMARY

DATE	February 27, 1965	
RAILROAD	Atchison, Topeka and Santa Fe	
LOCATION	Hodge, Calif	
KIND OF ACCIDENT	Rear-end collision	
EQUIPMENT INVOLVED	Rail-defect detector car	Freight train
TRAIN NUMBERS	Extra 9169 East	Extra UP 418 East
LOCOMOTIVE NUMBERS		Diesel-electric units 418, 440B, 419B, 417B, 402B
CONSIST		91 cars, 2 cabooses
SPEEDS	6 m p h	63 m p h
OPERATION	Signal indications	
TRACK	Double, 1°16' curve, 0 60 percent ascending grade eastward	
WEATHER	Clear	
TIME	1 05 p m	
CASUALTIES	1 killed, 2 injured	
CAUSE	Failure of the carrier and a conductor-pilot to ensure full protection for the operation of a rail-defect detector car, and failure of the detector car to shunt the track circuit and activate block signals, resulting in a false proceed signal indication	
RECOMMENDATION	The Atchison, Topeka and Santa Fe Railway Company take action to ensure that all of its divisions provide adequate protection for the operation of rail-defect detector cars and similar on-track equipment	

INTERSTATE COMMERCE COMMISSION

RAILROAD SAFETY AND SERVICE BOARD

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SYNOPSIS

On February 27, 1965, an eastbound Union Pacific Railroad freight train struck the rear end of an eastbound AT&SF rail-defect detector car while moving over the Atchison, Topeka and Santa Fe Railway at Hodge, Calif One AT&SF test department employee was killed Another test department employee and the conductor-pilot of the detector car were injured

This accident was caused by failure of the carrier and a conductor-pilot to ensure full protection for the operation of a rail-defect detector car, and failure of the detector car to shunt the track circuit and activate block signals resulting in a false proceed signal indication

Location and Method of Operation

The accident occurred on that part of the Los Angeles Division of the Atchison, Topeka and Santa Fe Railway extending between San Bernardino and Barstow, Calif , a distance of 81 3 miles This is a double-track line over which trains of the Union Pacific and the Atchison, Topeka and Santa Fe railroads are jointly operated Trains moving with the current of traffic operate by signal

indications of an automatic block-signal system, supplemented by an automatic train stop system for passenger trains At Hodge, 69 5 miles east of San Bernardino, a long siding parallels the eastward main track on the south The east siding-switch is 4,537 feet east of the station

The collision occurred on the eastward main track, 3,092 feet east of the Hodge station

Automatic signals 152, 134, and 122, governing eastbound movements on the eastward main track, are 4 5 miles, 2 5 miles, and 4,302 feet west of the collision point, respectively

Details concerning the tracks, signals, carrier's operating rules and bulletins, the Commission's pertinent signal rules and instructions (Ex Parte No 171), train, rail-defect detector car, damages, and other factors are provided in the appendix

Description and Discussion

At 7 30 a m on the day of the accident, an AT&SF conductor-pilot and two AT&SF test department employees reported on duty at Victorville, 44 6 miles east of San Bernardino, to operate AT&SF rail-defect detector car 9169 This car was equipped for movement on both highways and and rails and was to be operated on the eastward main track from Victorville to Hodge as Extra 9169 East, an eastbound train Shortly after 7 30 a m , the Victorville operator provided the conductor - pilot with a clearance card and a copy of a train order, which read in part as follows AT SIX FORTY 6 40 AM ALL FIRST CLASS TRAINS HAVE ARRIVED AND LEFT VICTORVILLE In addition, the operator informed the conductor-pilot it was anticipated that two AT&SF eastbound extra freight trains would pass Victorville about 8 20 and 10 30 a m The conductor-pilot and test department employees then placed the detector car on the eastward main track and left Victorville at 7 40 a m As the car moved eastward, one of the test department employees was at the controls in the cab, the other operated the ultrasonic rail defect detecting equipment in the car body The conductor-pilot was in the cab

The detector car proceeded toward Hodge at about six miles per hour, detecting several defects in the rails of the eastward main track When a defect was found, the car stopped and the test department employees examined the defective rail On these occasions, the conductor-pilot stood a short distance behind the car with a red flag to provide protection against following trains approaching at restricted speed When the car was moving, he relied on the automatic block signal system for full protection against following trains, although AT&SF Operating Bulletin No 104 stated that equipment such as detector cars could not be depended upon to activate block signals Except for clearing first-class trains, it was a customary practice, according to the conductor-pilot, for the detector car to operate on the main track until overtaken by a train He stated that the detector car was operated in accordance with this practice on the day of the accident In addition, he stated that a trainmaster had told him that this practice, and the procedure he followed for protection of the detector car, were satisfactory

Soon after the detector car left, the Victorville operator radio-telephoned the conductor-pilot and informed him that the two AT&SF eastbound freight trains would pass Victorville about 10 00

or 11 00 a m The conductor-pilot stated that after this conversation, he did not attempt to communicate with operators or the train dispatcher about eastbound extra trains because he relied on the signal system to protect the detector car against such trains The detector car continued eastward, and at various times, the conductor-pilot noticed it was activating block signals and automatic railroad crossing warning signals When the detector car was about six miles west of Hodge and was occupying the block of eastward signal 212, the first of the two AT&SF eastbound extra freight trains, Extra 1327 East, overtook the detector car and stopped short of signal 212, which displayed a Stop-and-Proceed aspect Shortly thereafter, the conductor-pilot of the detector car noticed that the car had been overtaken He then radio-telephoned the engineer of Extra 1327 East and told him the detector car would clear the eastward main track at a highway grade crossing in the block of signal 172, the next eastward signal The detector car passed signal 172 soon afterward and was removed from the eastward main track at the crossing, at which time the engineer of Extra 1327 East saw the aspect of signal 172 change from Stop-and-Proceed to Clear Extra 1327 East then passed signal 172 and the detector car at the crossing The engineer radio-telephoned the conductor-pilot of the detector car at this time and informed him that Extra 1216 East, the second of the two AT&SF eastbound extra freight trains, was closely following The detector car remained clear of the eastward main track at the crossing and, about 12 10 p m , as Extra 1216 East passed, the conductor-pilot radio-telephoned the conductor of that train and asked him if he had any knowledge of a following train The conductor replied that he knew of no train following Extra 1216 East from San Bernardino

After Extra 1216 East passed, the conductor-pilot and two test department employees placed the detector car on the eastward main track at the highway crossing and continued eastward The detector car passed signals 152, 134, and 122, and passed the west siding-switch at Hodge about 12 55 p m Approximately 10 minutes later, as the detector car moved eastward in the block of signal 122 at six miles per hour, it was struck from the rear by Extra UP 418 East, 3,092 feet east of the Hodge station and 1,445 feet west of the east siding-switch

The conductor-pilot and the test department employee in the cab of the detector car were injured The other test department employee was killed

Neither the surviving test department employee nor the conductor-pilot saw or heard Extra UP 418 East before the accident

According to the surviving test department employee, the detector car was operated and protected on the day of the accident in a customary manner

Extra UP 418 East, an eastbound Union Pacific Railroad freight train, consisting of 5 diesel-electric units, 91 cars and 2 cabooses, left San Bernardino at 10 20 a m and passed Victorville, the last open office, at 12 35 p m About 30 minutes later, it approached the accident point at 65 miles per hour, as indicated by the speed-recording tape Both the engineer and front brakeman stated that signals 152, 134, and 122 displayed Clear aspects, and that they called these aspects to each other Shortly after the train passed signal 122 and entered the $1^{\circ}16'$ curve involved, the engineer saw the detector car a short distance ahead A few seconds later, he realized it was occupying the eastward main track and he promptly applied the train brakes in emergency The collision occurred moments later, when the speed of Extra UP 418 East was reduced to 63 miles per hour

Tests made after the accident disclosed that the portion of the signal system involved functioned properly

According to statements made by employees not involved in the accident, there were occasions the day before the accident when automatic block signals were seen to be changing aspects from Stop-and-Proceed to Clear, and vice versa while the detector car was occupying the blocks of those signals A carrier official stated that he had also seen the aspects of signals change in this manner when the signal blocks were occupied by the detector car, indicating the detector car was not continuously shunting the track circuits

Because of damage resulting from the collision, the shunting apparatus of the detector car could not be reassembled and tested Examination, however, disclosed that the bracket supporting the shunt brush assembly on the rear right side of the car apparently had been broken some time before the accident in such manner that the bracket could not support the shunt brush It also disclosed evidence that a portion of the spring apparatus associated with one of the shunt brushes had been missing for some time before the accident, resulting in a reduction of the desired pressure of the shunt brush against the rail head Apparently the broken and missing portions of the shunting apparatus resulted in less effectiveness of this apparatus to shunt the track circuit continuously

Findings

The investigation disclosed that after the detector car left Victorville, it apparently shunted the track circuit and actuated signals until it passed signal 122 It then failed to shunt the track circuit while moving in the block of signal 122, resulting in loss of protection of the automatic block system The detector car was moving eastward at six miles per hour, without protection of the automatic block system or flag protection as prescribed by Rule 99 and Operating Bulletin No 104, when it was struck from the rear Although the detector car was moving under circumstances in which it could be overtaken by a train and bulletin instructions had notified all concerned that it could not be depended upon to activate block signals, the conductor-pilot relied only on the automatic block system for full protection against following trains and failed to provide flag protection as required

Signals 152, 134 and 122 displayed Clear aspects as a result of failure of the detector car to shunt the track circuit Extra UP 418 East passed these signals at 65 miles per hour and was moving at this speed, 5 miles per hour less than its maximum authorized speed, when the engineer saw the detector car on the curve a short distance ahead He applied the brakes in emergency and the speed of the train was reduced to 63 miles per hour when the collision occurred

The investigation further disclosed that it was a customary practice for the detector car to move slowly on the main track without being protected against following trains as prescribed by Rule 99 and Operating Bulletin No 104, and that the carrier apparently condoned or overlooked this practice From all indications, the carrier expected conductor-pilots of the detector car to place considerable reliance on the automatic block system and verbal information obtained by radiotelephone from operators and dispatchers, instead of upon prescribed procedures, for protection of the detector car against following trains

After the accident, the Los Angeles Division, as well as the San Francisco Terminals and Valley Division, issued bulletin instructions prescribing forms of train orders that must be used for protection of the detector car and similar on-track equipment in charge of a pilot Under these train order forms, detector cars may be authorized to operate on a designated track, between specified limits and times, without flag protection Trains either must not pass designated waiting points before the times given, or are required to approach and proceed at restricted speed through the given limits until the pilot named in the train order, after proper identification, has verbally reported the limits clear Other divisions of the carrier, however, have not adopted such protective measures for operation of detector cars and similar on-track equipment

It is apparent that one or two of the shunt brushes of the detector car might not have been in proper contact with the rail head on the day of the accident Because of this and the use of No 14 wire, instead of No 8 wire as contemplated by the builder, for a connection between the shunt brushes of the rear wheels, the effectiveness of the shunting apparatus was reduced and the detector car failed to shunt the track circuit while moving in the block of signal 122 Had the detector car continuously shunted the track circuit and activated signals 152, 134 and 122, the accident probably would have been averted

Cause

This accident was caused by failure of the carrier and a conductor-pilot to ensure full protection for the operation of a rail-defect detector car, and failure of the detector car to shunt the track circuit and activate block signals, resulting in a false proceed signal indication

Recommendation

It is recommended that the Atchison, Topeka and Santa Fe Railway Company take action to ensure all of its divisions provide adequate protection for the operation of rail-defect detector cars and similar on-track equipment

Dated at Washington, D C , this 1st
day of November, 1965

By the Commission, Railroad Safety and Service Board

(SEAL)

H NEIL GARSON,

Secretary

APPENDIX

Tracks

From the west there are, in succession, a long tangent, and a 1°16′ curve to the left 3,057 feet to the accident point and 734 feet eastward From the west, the grade is, successively, 0 68 percent descending a considerable distance, a vertical curve 1,350 feet, level 2,000 feet, a vertical curve 805 feet to the accident point and 290 feet eastward, and 0 63 percent ascending throughout a short distance farther eastward It is approximately 0 60 percent ascending eastward at the accident point

Signals

Signals 152, 134 and 122 are of the color-light type and are continuously lighted The aspects applicable to this investigation and the corresponding indications and names are as follows

SIGNAL	ASPECT	INDICATION	NAME
152 134 122	Green	Proceed	Clear
152	Yellow-over-yellow	Proceed, Approach Next Signal Not Exceeding Medium Speed, * * *	Approach-Medium
134	Yellow	Proceed Preparing to Stop At Next Signal, If Exceeding Medium Speed Immediately Reduce to Medium Speed	Approach
122	Red-over-Number plate	Stop	Stop and Proceed

The controlling circuits are so arranged that when the block of signal 122 is occupied and the blocks of signals 152 and 134 are unoccupied, signal 152 should display an Approach-Medium aspect, signal 134 an approach aspect, and signal 122 a Stop-and-Proceed aspect If the blocks of these three signals are unoccupied, the signals should display Clear aspects

Carrier's Rules and Bulletins

DEFINITIONS

PILOT - An employee assigned to a train or engine when the engineman or conductor, or both, are not fully acquainted with the physical characteristics or rules of the railroad, or portion of the railroad, over which the train or engine is to be moved

MEDIUM SPEED - A speed not exceeding 40 miles per hour

RESTRICTED SPEED - A speed that will permit stopping short of another train, obstruction or switch not properly lined, but not exceeding 20 miles per hour

SIGNALS

11 A train finding a fusee burning on or near its track must stop and extinguish it or wait until it has burned out The train may then proceed prepared to stop short of train, obstruction or switch not properly lined, for one mile

*15 The explosion of two torpedoes is a signal to be on the lookout for flagman, obstruction or train ahead for one mile * * * The explosion of one torpedo will indicate the same as two, but the use of two is required*

35 The following signals will be used by flagmen'

Day Signals - A red flag,
Torpedoes, and
Fusees

* * *

MOVEMENT OF TRAINS AND ENGINES

99 When a train or engine is moving under circumstances in which it may be overtaken by another train or engine, the flagman must drop lighted fusees and take such other action as may be necessary to insure full protection

*When a train or engine stops under circumstances in which it may be overtaken by another train or engine, the flagman must go back immediately with flagman's signals a sufficient distance to insure full protection, placing two torpedoes and, when necessary, in addition, displaying lighted fusees When trains or engines are under the protection of an automatic block system, * * *a sufficient distance to insure full protection is the distance necessary to insure full protection against a following train or engine approaching at restricted speed*

* * *

GENERAL SIGNAL RULES

320 At a "stop and proceed" signal, a train will be governed as follows

* * *

*(B) On two or more tracks, * * * stop, then proceed at once at restricted speed*

OPERATING BULLETIN NO 104

*Work equipment, such as rail detectors, * * * weed burners and similar "on-track" equipment cannot be depended upon to activate block, cab or interlocking signals, and warning devices at public crossings*

When protecting such equipment as required by Rule 99, it must (not) *be assumed that such equipment is under the protection of block, cab or interlocking signals, and a sufficient distance to insure full protection is the distance necessary to insure full protection against a following, or opposing, train or engine approaching at maximum authorized speed*
(Note - The word "not" was inadvertently omitted in the 1965 edition of the book of Operating Bulletins issued to employees)

Interstate Commerce Commission's Rules, Standards and Instructions (Ex Parte No 171)

*§136 51 Track circuit requirements - Track relay shall be in deenergized position whenever any of the following conditions exists, * * **

* * *

*(b) When a train locomotive, or car occupies any part of a track circuit, * * **

Train

Extra UP 418 East consisted of diesel-electric units 418, 440B, 419B, 417B and 402B, coupled in multiple-unit control, 91 cars and 2 cabooses, in that order The brakes had been tested and had functioned properly when used en route The headlight was lighted As the train approached the collision point, the engineer and front brakeman were in the control compartment of the first diesel-electric unit The conductor and flagman were in the caboose

Rail-Defect Detector Car

The detector car was a 1958 model Dodge motortruck owned and operated by the Atchison, Topeka and Santa Fe Railway Company It had a special body (see photo appended to this report) and was equipped for movement on both rails and highways In addition to conventional tire-mounted wheels, it had retractable flanged wheels at the front and rear for guides when operating on rails The car was provided with ultrasonic equipment for detecting defective rails It was 17 feet 2 inches long between the front and rear flanged wheels and weighed about 12,500 pounds, with 800 pounds carried on the rear flanged wheels and 600 pounds carried on the front flanged wheels when operating on rails

The assembly for each flanged wheel supported a bracket, which held a short piece of 1-1/8 inch wire rope, or shunt brush, in vertical position The top of the shunt brush was welded solid The bracket and wheel assembly was so designed that when the retractable wheels were lowered to the rails, the bottom end of the shunt brush associated with each flanged wheel came in contact with the top of the rail head and brushed along the rail head during movement of the car Each shunt brush assembly was spring loaded to effect a total of 19 pounds downward pressure against the rail head The shunt brushes of the front pair of wheels were connected by insulated No 8 copper wire, the shunt brushes of the rear wheels were connected by insulated No 14 copper wire There was no connection between the front and rear shunt brushes

Damages

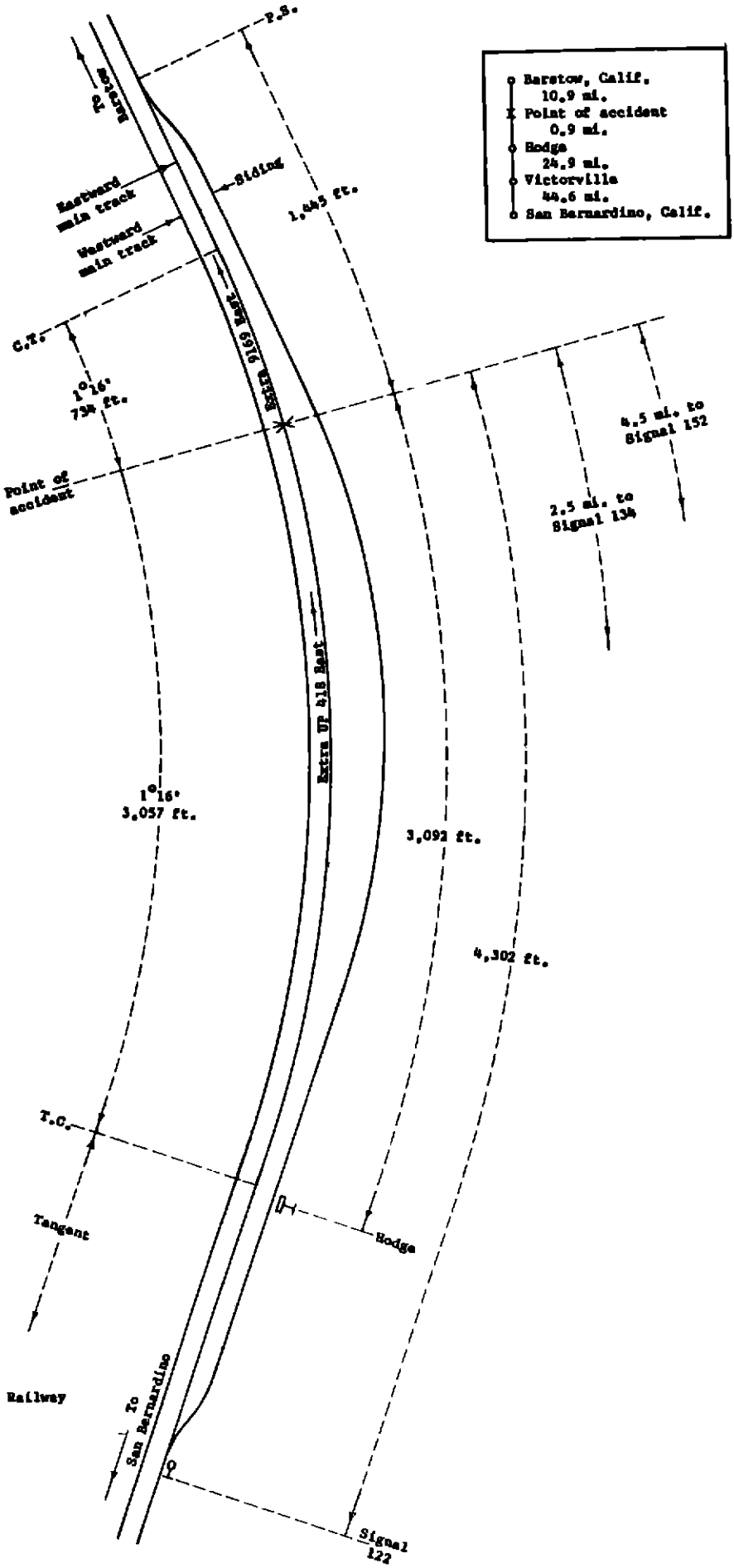
Extra UP 418 East stopped with the front end 2,911 feet east of the collision point None of its equipment was derailed The first diesel-electric unit was slightly damaged

The rail-defect detector car was derailed and stopped on the westward track structure 1,587 feet east of the collision point It was destroyed

Other Factors

The accident occurred at 1 05 p m , in clear weather

The maximum authorized speed for freight trains in the accident area is 70 miles per hour



The Atchison, Topeka and Santa Fe Railway
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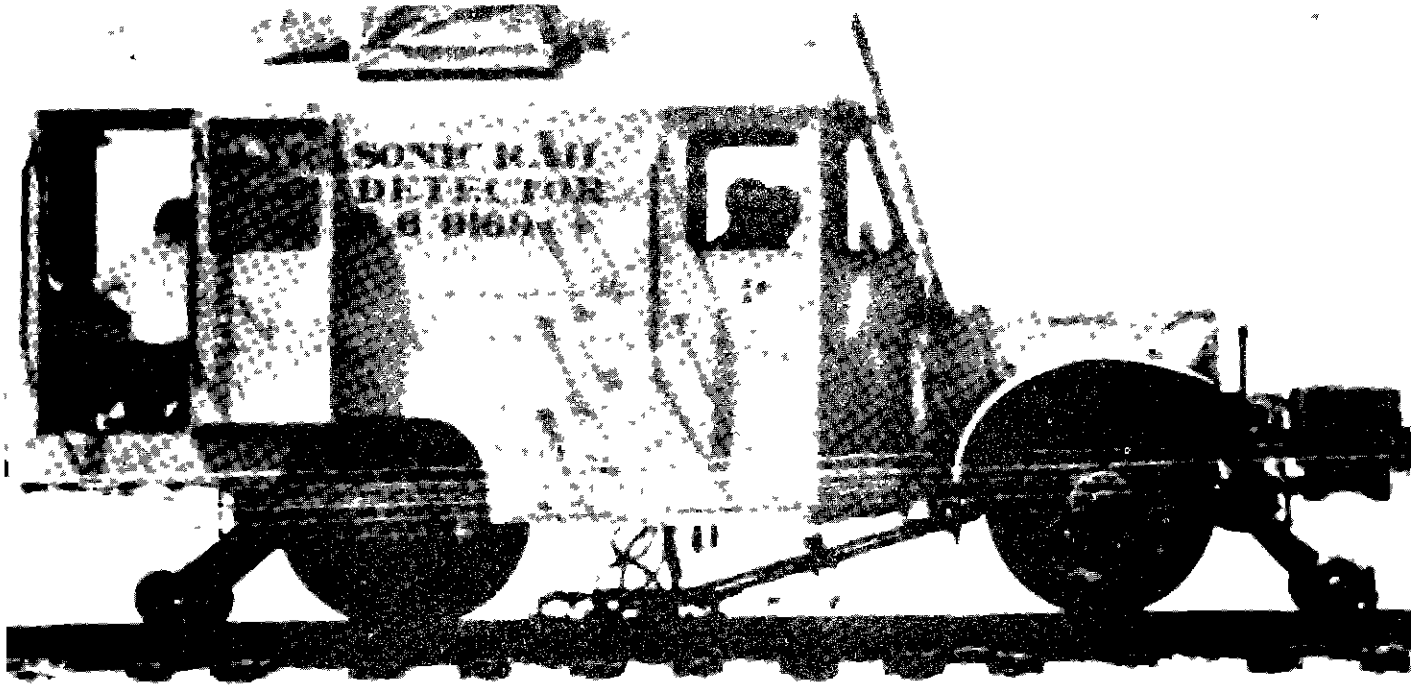
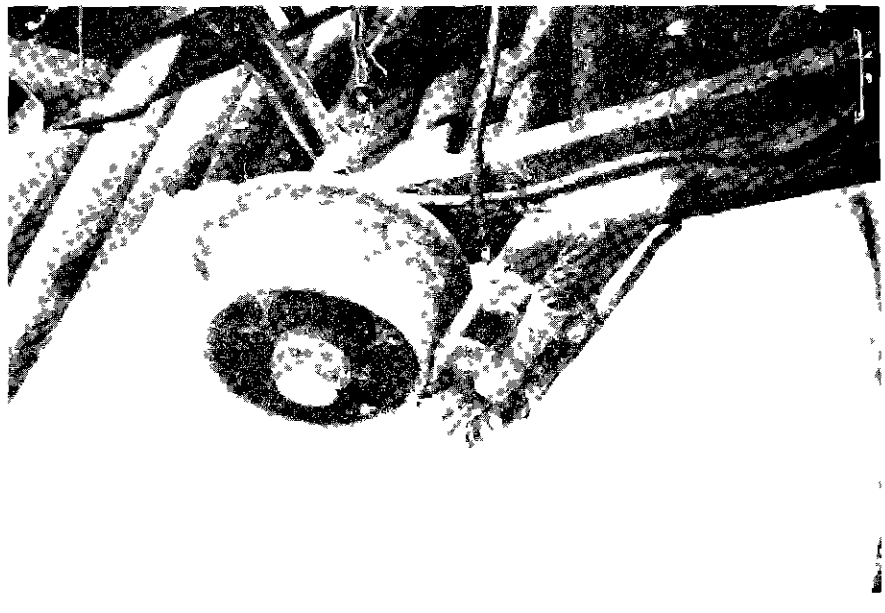


Rail defect detector car 9169 (1959 photo)



Flanged wheel [illegible] to [illegible] front brush vertical rope wire with frayed cotton [illegible] shunt connection