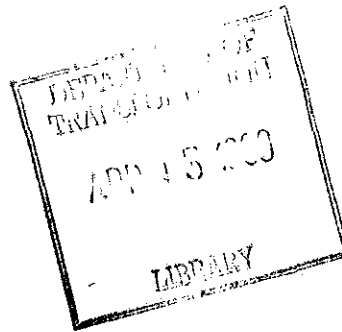


HE
1780
A32
no.
12-88

Department
of Transportation
**Railroad
Administration**

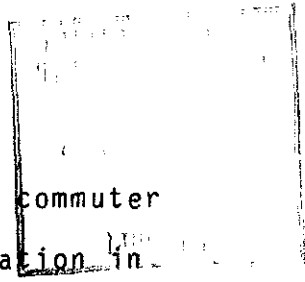
Railroad Accident Investigation Report, No. 12-88.

**Southeastern Pennsylvania Transportation Authority
Norristown, Pennsylvania
January 12, 1988**



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12-88

SUMMARY



On January 12, 1988, at 1:40 p.m., a northbound SEPTA commuter train en route from Philadelphia to the Elm Street Station in Norristown, Pennsylvania, was struck head on by a runaway covered hopper car. The hopper car had rolled free from a siding approximately one quarter mile beyond SEPTA's Elm Street station, run through a derail on the siding and then through two turnouts onto SEPTA's Norristown line single main track. Data on damages and injuries, as well as the methodology of the post-accident investigation, is set forth in the succeeding paragraphs.

The primary cause of the accident was improper handling of the equipment by a Conrail mechanical department employee, who failed to adequately secure (i.e., "chock") the wheels of a stationary hopper car when he manually released its brakes.

Contributing to the accident was the failure of a "derail device" which had been installed on the Matlack siding to prevent cars from rolling onto the main track. Apparently, a component of the device shattered upon impact with the lead wheels of the hopper car. Failure of the device was caused by Conrail's failure to replace a bent screw jaw which forced the full impact of a rolling car onto the one undamaged side of the screw jaw, which was unable to sustain the stress.

Events

On January 12, 1988, at 1:40 p.m., a northbound SEPTA commuter train, en route from Philadelphia to the Elm Street Station in Norristown, PA, was struck head-on by a runaway covered hopper car. The SEPTA train, having just left the DeKalb Street Station in Norristown, was stopped at a stop signal, in a sharp curve to the right on single track. Just after stopping the train, the SEPTA engineer saw the oncoming freight car and attempted to reverse direction. Simultaneously, the conductor warned the passengers to brace themselves. The collision occurred while the SEPTA train was stationary. The speed of collision was low, which contributed to minimal injuries. The conductor's warning to the passengers also served to minimize the injuries. Seven passengers were slightly injured; they were taken to a local hospital, treated and released.

Preliminary findings in this investigation indicate that the covered hopper car (NAHX 90258) ran away from a siding at the Matlack Company, about 1/4 mile beyond SEPTA's Elm Street Station, ran through a derail on the siding and then through two turnouts and onto SEPTA's Norristown Line single main track. Through post-accident inspections and interviews, it appears that the covered hopper ran away as a result of improper handling by a Conrail mechanical department employee while he was attempting to move the car within the siding for unloading.

The January 13, 1988, post-accident inspection and testing of covered hopper NAHX 90258's braking systems revealed that all components were functioning as intended. Through interviews, it was determined that the SEPTA train was stationary at the moment of collision. The engineer tried to put the train into reverse to avoid or minimize the impact but was unsuccessful.

The signals in the area were inspected and found to be functioning properly, confirming information provided by the SEPTA crew. When the runaway covered hopper entered the block ahead of the SEPTA train, it caused a signal to go to "Stop" as the SEPTA train approached. The SEPTA engineer complied with the signal and stopped the train. This was prior to the runaway car coming into view. By warning the engineer of the car's presence, the signal system avoided what could have been a more serious accident.

An inspection was made of the derail at the Matlack Company siding. The rod connecting the derail to its operating stand was found to be broken at the point where it would attach to the stand. The break appeared to be 100 percent new, and the separated piece was found several feet away against a property fence. This would indicate sudden failure due to impact forces being applied.

Emergency response was prompt and consisted of several rescue squads and ambulance services being dispatched. Norristown

police and SEPTA police also responded within a few minutes of the accident. All of the injured passengers were removed from the train within 58 minutes of the accident, and taken to a local hospital. All were treated for minor injuries and released.

Preliminary estimates of damage to railroad facilities consisted of the following:

| | | |
|-----------|----|----------------|
| Track | \$ | 300 |
| Equipment | | <u>125,800</u> |
| | | \$126,100 |

The above information is a compilation of information contained in the individual discipline summaries, which are given below.

Operating Practices

The following information was developed from contact with SEPTA officials and interviews conducted with SEPTA crewmembers.

The SEPTA engineer and conductor after being off duty longer than the required statutory off duty period, reported for duty at SEPTA's Roberts Yard at 5:39 a.m., January 12, 1988, for assignment to Run #293. The required brake test and cab signal test were performed by the crew prior to departing Roberts Yard. Assignment Run #293 consists of six scheduled train runs a day. On January 12, 1988, four scheduled train runs assigned to Run

#293 had been completed with no incident. The fifth scheduled run, Train 0626, was to be operated from the town of Cynwyd to Elm Street, Norristown. Train 0626 departed Cynwyd at 12:26 p.m. and performed normal station stops along the Norristown Branch until its arrival at DeKalb Station. Train 0626 arrived DeKalb Station at 1:35 p.m. The home signal at CP Kalb located at the end of DeKalb Station was in the Stop position. The conductor radioed Conrail's Norris Tower to determine why the signal was in the Stop position. Seconds later the signal went to Medium Approach, to Medium Clear. The train proceeded past CP Kalb, going from double track to single track, around a right hand curve and approached the signal at CP Bridge. The signal at CP Bridge was in the Stop position. The speed of the train approaching CP Bridge was about 10 mph. The engineer, seeing the Stop signal at CP Bridge, started a full service brake application. At the same time, the conductor was changing the channel on the radio from 4 (SEPTA channel) to 1 (Conrail channel) in order to talk to the operator at Norris Tower about the Stop signal at CP Bridge. The train stopped at CP Bridge. It was then, while stopped, that the engineer and conductor noticed a covered hopper car coming toward them. At first the crew thought the covered hopper car was being shoved by a locomotive, but a second later they realized the covered hopper was running freely. The conductor instructed the engineer to back up. The engineer attempted to do so, but the brakes went into emergency before the train could move. The conductor left the cab to warn the passengers to brace themselves. He then sat

in the second row, fireman's side of the train and braced himself for the impending collision. The engineer decided to open the right side door of the cab and jump. She landed on her left side, got up and ran away, thinking the train may fall on its side.

Toxicological samples were taken from the SEPTA engineer and conductor at Hahnemann Hospital in Philadelphia, PA. They arrived at the hospital at 4:10 p.m. and samples were taken and forwarded by Express Mail to the Center for Human Toxicology in Salt Lake City, Utah, at 6 p.m. on January 12, 1988.

SEPTA obtained these toxicological samples under the Federal mandatory Post Accident Testing regulations. (A train accident involving impact resulting in reportable injury or \$50,000 damage or more to railroad property.) The samples from both the engineer and conductor tested negative for alcohol and drugs.

Human Factors; Emergency Response

On January 12, 1988, at approximately 1:42 p.m., the Norristown Police Department received an emergency call reporting a collision between a runaway freight car and a passenger train located south of Water Street under the Dannahower Bridge in Norristown, PA. A patrol car was dispatched at 1:42 p.m. and arrived at the site at 1:43 p.m. The Montgomery Hospital

Ambulance Service, made aware of the accident by scanner, already had one ambulance unit en route before receiving a call at 1:45 p.m. from Norristown Police at the site. Arriving at 1:47 p.m., the paramedics assessed the situation and immediately radioed for more ambulance and fire department assistance. Two more Montgomery Hospital Ambulances were dispatched and arrived at 1:48 p.m. A third unit was dispatched at 1:54 p.m. and arrived at 1:59 p.m. The Montgomery County Communication Center received the call from the ambulance at the site at 1:55 p.m. and dispatched a heavy rescue truck unit 27-6 from the Fairmont Fire Engine Co. No. 2 of the Montgomery Station 27-D. The fire truck arrived at the site at 2:04 p.m. Two SEPTA Police Units arrived at the site within 15 minutes after the accident occurred. The Red Cross Disaster Service Chairman for the Schuylkill Valley Branch arrived at the site at approximately 1:45 p.m. in response to the emergency call over the Red Cross scanner. All victims were removed from train cars by 2:38 p.m. Within minutes after arriving the ambulance paramedics began to administer emergency medical care to injured victims. Six victims were transported to Montgomery Hospital by ambulance. A seventh victim accompanied a relative in an ambulance, and upon arriving at the hospital began to experience some pain, and was therefore treated as well. All seven victims were treated for minor injuries and released.

Signals and Train Control

A post-accident inspection was made of the signal equipment between Elm Street and DeKalb Station, and it was determined that all parts of the signal system were functioning properly.

Since the signal system was not involved as a probable causal factor, extensive "teardown" tests were not conducted.

Equipment

The covered hopper car had been situated on a siding of the Matlack Company about 1/4 mile north of (beyond) the Elm Street Station, on the Stoney Creek Branch of Conrail. The branch begins at a turnout just south of the Elm Street Station platform. Post-accident inspection and testing on January 13, 1988, of this car's braking systems revealed all handbrake and air brake components to be functioning as intended. Statements were received from Matlack Company employees and from a Conrail car inspector who had been at the Matlack Company siding when the covered hopper ran away. According to those statements, the Matlack employees had attempted to move the car slightly to complete unloading, but found the brake shoes frozen to the wheels. A call was made to Conrail to send a car repairman to work on the brakes. Upon his arrival he released the handbrake fully, with no result. There was a wooden chock under one of the car's wheels. The car repairman began manually attempting to break the brake shoes free from the wheels when the car began to roll, pushing the chock out of the way. One of the Matlack

employees climbed onto the car to try to apply the handbrake but decided otherwise as the car began to increase speed. He jumped off and the runaway car proceeded past the derail and out through the switch. It was not noticed whether the derail was in the derailing position. The runaway car continued onto the SEPTA single main track until it collided with the standing SEPTA train.

The collision resulted in extensive damage to SEPTA multiple unit No. 232, and substantial damage to multiple unit No. 236. In addition, covered hopper NAHX 90258 sustained minor damage. This included damage to the handbrake wheel and bell crank.

Preliminary inspections of the lead multiple unit 232 conducted at 4:15 p.m. on January 12, 1988, revealed that the reverser was centered and the brake valve was in the released position. Inspection of the interior of MU 232 revealed the left No. 2, 4, 16 and 24 seat cushions disengaged from the seat frames and the right side center emergency window out. Examination of the running gear revealed all wheels on the front truck derailed. No slid flat spots were readily visible. Preliminary inspection of the trailing MU 236 revealed that all emergency windows and seats were in place. Examination of the running gear revealed no wheels derailed.

Total damage incurred to SEPTA equipment was estimated at \$125,000 (SEPTA MU 232 - \$100,000 and SEPTA MU 236 - \$25,000).

Preliminary inspection of covered hopper car NAHX 90258 conducted at 4:00 p.m. on January 12, 1988, revealed the following: the air brake cylinder piston was in the released position; no piston travel; the high fiber steel brake shoes were properly secured to the brake beam heads; the brake shoes were not worn to the extent that the backing plates contacted the wheels; all brake shoes were clear of the wheels; the handbrake rod at the brake cylinder was loose. The handbrake, Equipco AAR 1955, Model No. 5750 on and off type E with standard brake wheel, could not be operated at the time of inspection. The handbrake wheel and bell crank were bent and inoperative, and the handbrake step was broken. These conditions required repair before testing could be conducted.

At 5:15 p.m., after car NAHX 90258 had been pulled from the position of the collision, an air brake test was made. The air brake system and all appurtenances excluding the handbrake operated as intended. No slid flat spots, cracks, breaks, gouges, chips were readily visible in wheel flanges, treads, rims, plates or hubs. Car NAHX 90258 was moved to Abrams Yard, King of Prussia, PA. for further examination and repair on January 13, 1988. The carrier renewed the handbrake wheel and the bell crank and the handbrake then functioned as intended.

Total damages incurred to hopper car NAHX 90258 were estimated at \$800.

Track Components

The Matlack Company siding is located about 1/4 mile north of the turnout which begins the Stoney Creek Branch of Conrail and also leads to the Elm Street SEPTA Station. The attached sketch shows the track arrangements in the general area. The Matlack siding was equipped with a Hayes sliding derail, operated by a hand-throw stand of a design used widely by the old Reading Company, which originally owned this trackage. The investigation found the derail in the "off", or non-derailing, position. Examination revealed a broken screw jaw on the end of the connecting rod which attaches to the hand throw crank with a steel pin. The break appeared to be a 100 percent new break. The piece broken off was found several feet away against a fence, indicating a sudden failure due to high impact forces being applied, most likely by the lead wheels of the runaway car as it passed over the derail. The screw jaw at that end of the connecting rod were flared, or spread apart, enough to not allow the connecting pin to go through both, thus placing the full impact force onto one screw jaw. The screw jaw broke rather than the pin because the screw jaw is cast steel and the pin is forged.

It could not be determined whether the derail shoe was fully in place on the rail head or whether the throw lever was in a fully horizontal position prior to being run through. Marks on the derail were not conclusive as to whether they were new that day.

There were marks that would indicate that the derail shoe was hit by a wheel and pushed back out of the way, but they were slightly rusty. In any case, failure of the device was caused by Conrail's failure to replace a bent screw jaw whenever it occurred which forced the full impact of a rolling car onto the one undamaged side of the screw jaw which was unable to sustain the stress.

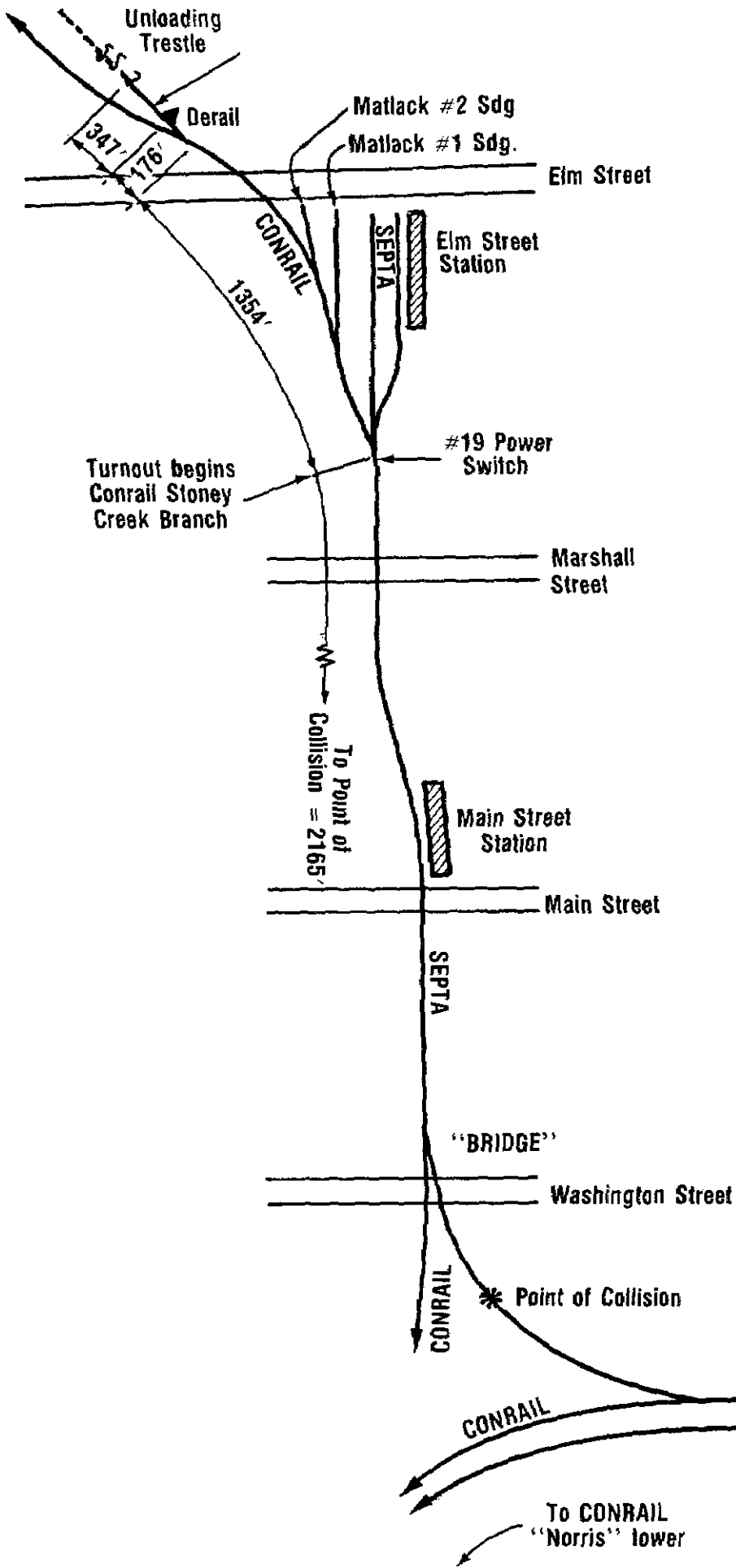
No other defects or unusual conditions were found at the derail or its operating stand.

Inspection of the turnouts encountered by the runaway freight car confirmed that two turnouts had been run-through by the car: the turnout leading from the Matlack siding to the Stoney Creek Branch main track, and the turnout connecting the branch to SEPTA's single main track just south of the Elm Street Station.

Damages to the track structure and its components consisted of the broken derail connecting rod screw jaw and some displacement of the rail at the point of collision, totaling \$300.

Attached are the following:

1. Map of area showing landmark locations and pertinent distances.
2. Gradient profile of area.
3. Diagram of Hayes sliding derail, also showing connecting rod design.

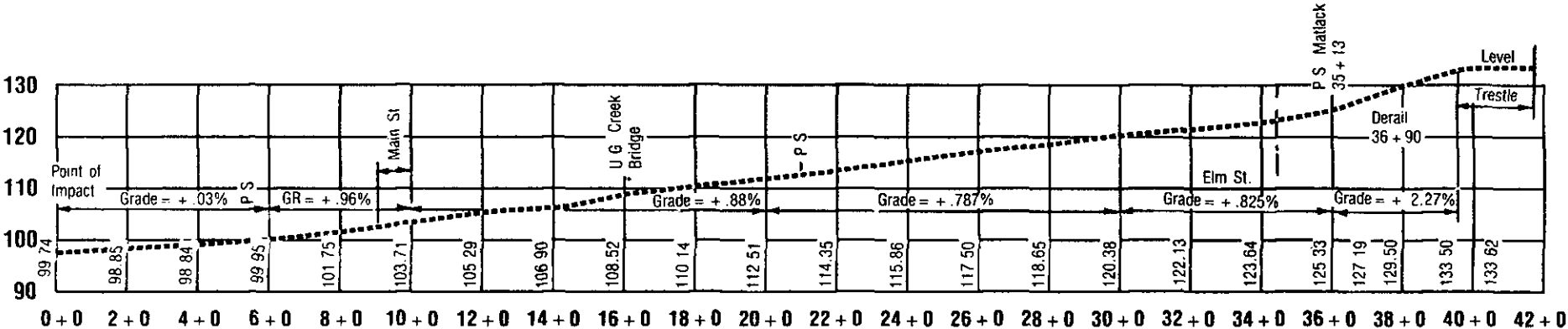


NORTH
(Approximate)

NORRISTOWN, PA

Total distance from trestle to point of collision = 4042'

GRADE DIAGRAM



**Consolidated Rail Corporation
Eastern Region Philadelphia Division, Norristown, PA**

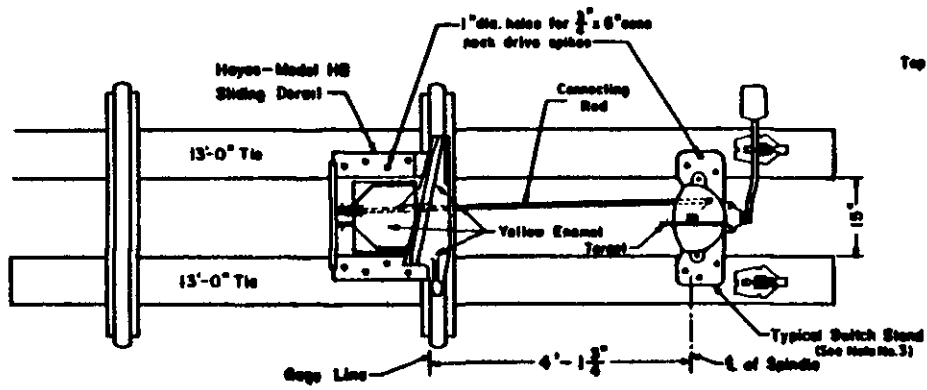
Unusual Occurrence Involving

Freight Car and SEPTA Passenger Car

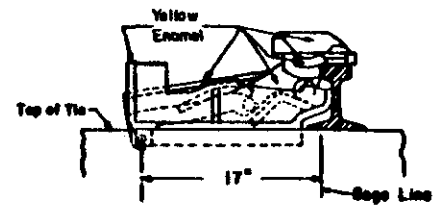
**Office of Area Engineer, Philadelphia, PA.
(Scale: As Shown)
January 12, 1988**



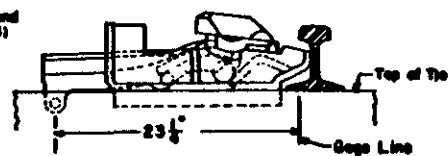
LOCATION OF DERAIL



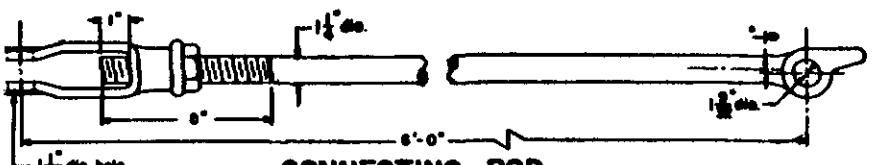
SWITCH STAND AND DERAIL INSTALLATION



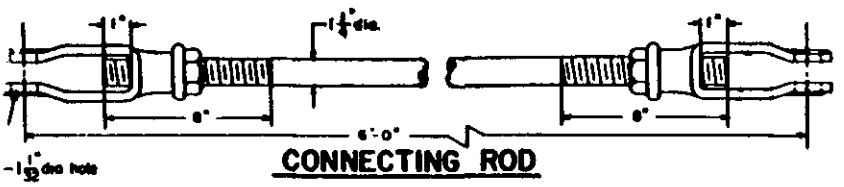
DERAIL IN "NORMAL POSITION"



DERAIL IN "REVERSE POSITION"

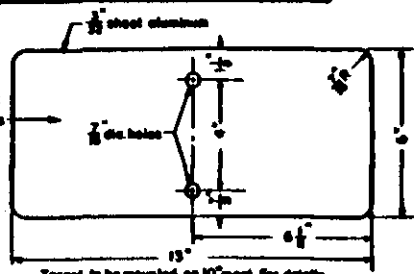


CONNECTING ROD FOR NEW CENTURY SWITCH STAND



CONNECTING ROD FOR OTHER TYPES OF SWITCH STANDS

Red Reflectorized Scotchite No. 2272 applied on both sides



Target to be mounted on 10" wood. For details see C. R. Plan 73919-11.

TARGET DETAILS

NOTES

- 1 - Derail shall be placed a sufficient distance back of the clearance point to make sure that derailed rolling equipment will not foul the main or other track.
- 2 - The following switch stands are to be used to operate derails - New Century, Economy, Odenbirk or Remage No. 26-E
- 3 - Switch stand to be in tension, with rod target perpendicular to the rail, when the derail is in the normal position.
- 4 - When ordering derail specify - Model, Size and Hand.
 Size 6 - for 90lb rail to 110lb rail
 Size 7 - for 110lb rail to 140lb rail
 Size 8 - for 140lb rail to 168lb rail

The hand is determined by looking in direction of movement of the car to be derailed, a right hand derail goes on the right hand rail and derails towards the right. Conversely with the left hand.

- 5 - All orders should state that derails will be operated by switch stands having a 5" throw.
- 6 - The aluminum surfaces of the derail target shall be thoroughly cleaned with *Switzer No. 7* before application of scotchite by the use of heat (to activate the adhesive) and vacuum pressure (to mold the material to the aluminum surface).
- 7 - When fastening target to the wood, care should be exercised to reduce the possibility of damaging the scotchite material.
- 8 - Derail is to be painted with yellow enamel over primer.

CONRAIL 73920-A

STANDARD
**METHOD FOR INSTALLING
 HAYES SLIDING DERAIL
 MODEL - HB**

NOVEMBER 1976
R.H. Smith Chief Engineer - Maintenance of Way
R.B. Yaker Chief Engineering Officer