

INTERSTATE COMMERCE COMMISSION  
WASHINGTON

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INVESTIGATION NO. 2642  
THE MISSOURI-KANSAS-TEXAS RAILROAD COMPANY  
REPORT IN RE ACCIDENT  
AT BOONVILLE, MO., ON  
OCTOBER 27, 1942

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SUMMARY

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Railroad: Missouri-Kansas-Texas  
Date: October 27, 1942  
Location: Boonville, Mo.  
Kind of accident: Derailment  
Train involved: Passenger  
Train number: Extra 378 South  
Engine numbers: 856-378  
Consist: 12 cars, caboose  
Estimated speed: 35-45 m. p. h.  
Operation: Timetable, train orders and  
automatic block-signal system  
Track: Single; 5°58' curve; 0.857 percent  
ascending grade southward  
Weather: Clear  
Time: 8:37 a. m.  
Casualties: 1 killed; 10 injured  
Cause: Accident caused by excessive  
speed on a sharp curve having  
irregularities in surface,  
alinement and gage

INTERSTATE COMMERCE COMMISSION

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INVESTIGATION NO. 2642

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS  
UNDER THE ACCIDENT REPORTS ACT OF MAY 6, 1910.

THE MISSOURI-KANSAS-TEXAS RAILROAD COMPANY

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January 15, 1943.

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Accident at Boonville, Mo., on October 27, 1942, caused by  
excessive speed on a sharp curve having irregularities  
in surface, alinement and gage.

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REPORT OF THE COMMISSION<sup>1</sup>

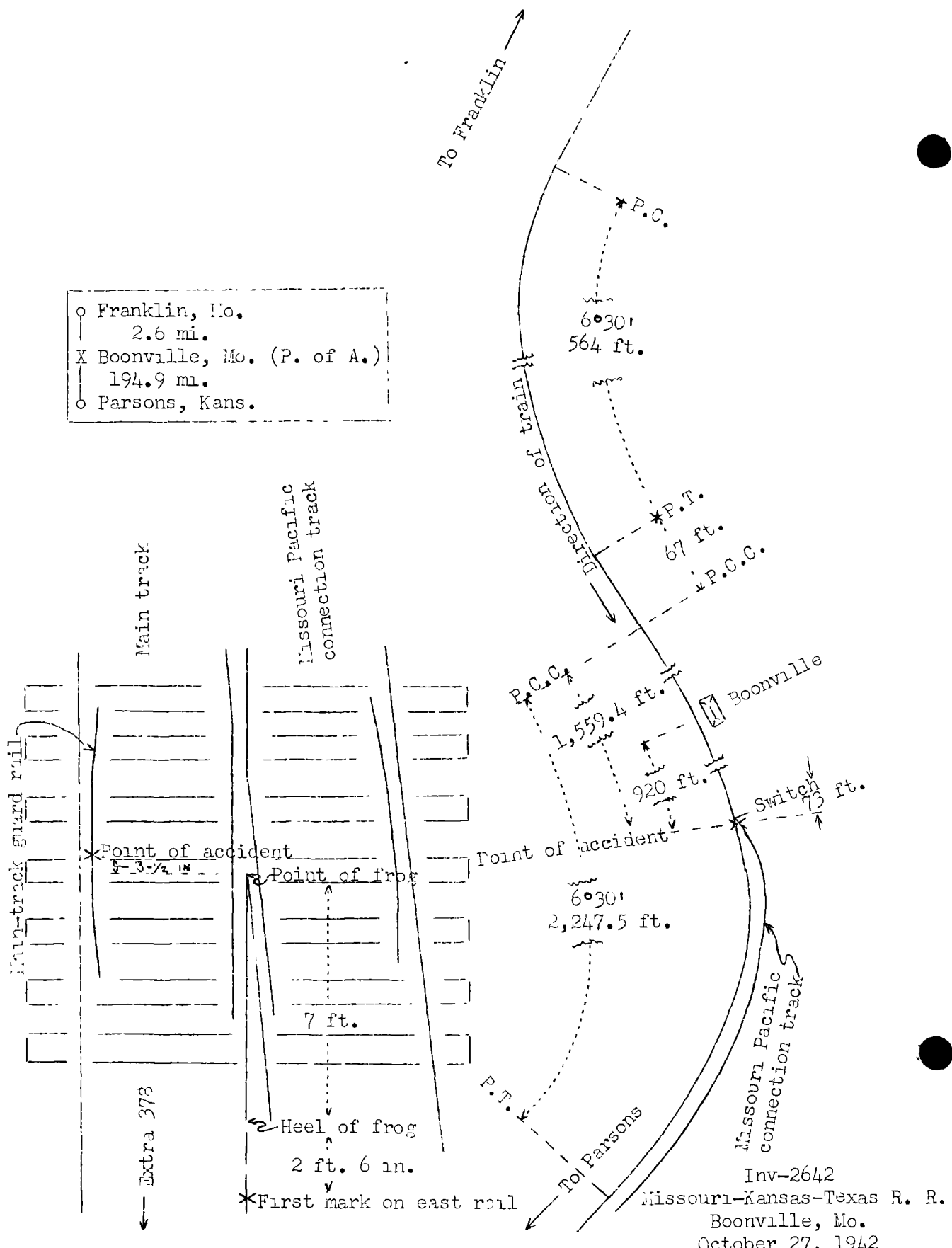
PATTERSON, Commissioner:

On October 27, 1942, there was a derailment of a  
passenger train on the Missouri-Kansas-Texas Railroad at  
Boonville, Mo., which resulted in the death of one train-  
service employee and the injury of five passengers, one  
Pullman employee and four train-service employees.

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<sup>1</sup>Under authority of section 17 (2) of the Interstate Com-  
merce Act the above-entitled proceeding was referred by the  
Commission to Commissioner Patterson for consideration and  
disposition.

o	Franklin, Mo.	2.6 mi.
X	Boonville, Mo. (P. of A.)	194.9 mi.
o	Parsons, Kans.	



Inv-2642  
 Missouri-Kansas-Texas R. R.  
 Boonville, Mo.  
 October 27, 1942

### Location of Accident and Method of Operation

This accident occurred on that part of the Northern District designated as the Sedalia Division and extending between Franklin, Mo., and Parsons, Kans., a distance of 197.5 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by timetable, train orders and an automatic block-signal system. At Boonville a track designated as the Missouri Pacific connection track parallels the main track on the east. Entry to this track is made at a point 847 feet south of the station through a facing-point switch for south-bound movements. The accident occurred on the main track at a point 73 feet south of the switch. Approaching from the north there are, in succession, a 6°30' curve to the left 564 feet in length, a tangent 67 feet and a compound curve to the right 2,247.5 feet in length, the curvature of which varies between 3°46' and 6°30'. Because of a switch-frog installation at a point 1,547 feet south of the northern end of the compound curve there is a 12-foot tangent. The derailment occurred on this tangent. The grade for south-bound trains varies between 0.275 and 0.4 percent descending 1,700 feet, then there is a vertical curve 600 feet, which is followed by a 0.357 percent ascending grade 85.5 feet to the point of accident and 514.7 feet beyond.

On the curve involved the track structure consists of 90-pound ARA-A rail, 39 feet in length, laid in 1928 on an average of 24 hardwood ties to the rail length; it is fully tieplated, double-spiked on the inside and single-spiked on the outside of the rails, provided with four rail anchors per rail length, and is ballasted with cist and crushed rock to a depth of 11 inches. At the point of derailment the superelevation was 3-1/8 inches and the gage was 4 feet 8-7/16 inches.

The frog involved is of the 90-pound ARA-A No. 9 rigid type. It is 12 feet in length and designed for tangent track. At the theoretical point of frog the wing spread is 4 inches. The point of frog and the tread were restored to specifications by welding in June, 1941. A guard rail is located inside the west rail of the main track, and its center is 12 inches north of the actual point of frog. The guard rail is 8 feet 3 inches in length, and the ends are flared so that the north and south ends are, respectively, 4-3/16 inches and 4-1/4 inches distant from the running rail. End blocks, clamps and filler-blocks are provided and the flangeway is 1-7/8 inches in width. At a point 19 inches south of the point of frog, the plates under the frog and the tieplate opposite it under the main-track

guard rail bore indications of an outward movement of 3/16 inch.

The maximum authorized speed for the passenger train involved, which was being hauled by a freight engine and a passenger engine, is 45 miles per hour.

#### Description of Accident

Extra 378 South, a south-bound passenger train, consisted of engines 856 and 378, coupled, two Pullman tourist cars, one baggage car, one Pullman tourist car, two standard Pullman cars, one baggage car, two coaches, one baggage car, two standard Pullman cars and a cabooses, in the order named. All cars were of steel construction except the cabooses, which was of steel-underframe construction. At Franklin, 2.6 miles north of Boonville and the last open office, a terminal air-brake test was made, and the brakes functioned properly en route. This train departed from Franklin at 8:32 a. m., according to the dispatcher's record of movement of trains, and while moving at an estimated speed of 35 to 45 miles per hour the No. 1 pair of driving wheels of the first engine became derailed to the left at a point 3-1/2 inches north of the point of frog of the Missouri Pacific connection track.

Engine 856 and its tender continued in line with the track a distance of 1,061 feet, and stopped on their left sides east of the main track and parallel to it. The cab was demolished and the cistern was badly damaged. Engine 378 stopped on its left side about 20 feet to the rear of engine 856, and at right angles to the tracks. The cab was demolished and the engine was otherwise badly damaged. The tender was torn loose from the engine and stopped on its left side at the rear of engine 378 and at an angle of about 45 degrees to the track. The cistern was badly damaged. The first car was derailed and stopped east of the connection track and at an angle of 15 degrees to it and leaned to the east at an angle of 40 degrees. The side snects, side sills, end-platform beams, end posts and end sheets were bent. The second car was derailed to the east and stopped, practically upright, on the connection track and in line with it. This car was badly damaged. The third car stopped upright, across the tracks and at an angle of 45 degrees to them. The front truck of the fourth car was derailed.

It was clear at the time of the accident, which occurred about 8:37 a. m.

The train-service employee killed was the engineer of engine 378. The train-service employees injured were the fireman of engine 378, the front brakeman and the flagman, and a conductor who was acting as pilot.

### Mechanical Data

After the accident an inspection of engines 356 and 378 disclosed that the height and thickness of the flanges were within the prescribed limits. All driving-box shoes and wedges were well lubricated. The lateral motion of all wheels and the back-to-back measurements of the engine-truck wheels and the driving-wheel tires and trailer-truck tires conformed to the prescribed requirements. The spring rigging and equalizers were in suitable condition for service.

Engine 356 is of the 2-8-2 type. The total weight in working order is 315,000 pounds. The diameters of the engine-truck wheels, the driving wheels and the trailer-truck wheels are, respectively, 33, 60-19/32 and 43-1/4 inches. The tender is rectangular in shape and has two four-wheel trucks. The weight of the tender loaded is 194,300 pounds. The rigid wheelbase of the engine is 16 feet 6 inches, and the total length of the wheelbase is 35 feet 8 inches. The total length of the engine and tender is 81 feet 2 inches. The last Class 3 repairs were completed on December 17, 1941, and the last certificates were issued on September 17, 1942. The accumulated mileage was 77,574 miles.

Engine 378 is of the 4-6-2 type. The total weight in working order is 272,000 pounds. The diameters of the engine-truck wheels, the driving wheels and the trailer-truck wheels are, respectively, 33, 73 and 47-1/4 inches. The tender is rectangular in shape and has two six-wheel trucks. The weight of the tender loaded is 263,000 pounds. The rigid wheelbase of the engine is 13 feet, and the total length of the wheelbase is 35 feet 3 inches. The total length of the engine and tender is 82 feet 6-1/8 inches.

### Track Data

After the accident, measurements of the track taken throughout a distance of 657 feet north of the point of accident were as follows:

<u>Distance north of point of frog</u>	<u>Super- elevation</u>	<u>Superelevation under load</u>	<u>Gage</u>
657'	3-7/16"	3-1/2"	4'8-1/4"
636'	3-7/16"	3-1/2"	4'8-1/8"
617'8"	3-3/8"	3-5/8"	4'8-5/8"
598'	3-3/8"	3-7/16"	4'8-5/16"
578'9"	3-1/4"	3-5/16"	4'8-1/2"
558'8"	3-1/4"	3-3/8"	4'8-7/16"
538'9"	3-1/4"	3-1/8"	4'8-3/4"
519'7"	3-1/8"	3-1/16"	4'8-5/8"
500'7"	3-1/8"	3-1/16"	4'8-1/2"
480'4"	3-1/4"	3-1/16"	4'8-3/8"
461'6"	3-1/8"	3-1/16"	4'8-1/2"
441'3"	3-3/8"	3-3/8"	4'8-1/2"
422'7"	2-7/8"	2-7/8"	4'8-7/8"
401'9"	2-7/8"	2-7/8"	4'8-3/8"
383'7"	2-7/8"	2-7/8"	4'8-7/8"
362'6"	3-1/4"	3-1/8"	4'8-1/2"
343'6"	2-3/4"	2-3/4"	4'8-7/8"
323'5"	3"	3"	4'8-5/8"
305'5"	2-15/16"	2-13/16"	4'8-7/8"
*284'	3-1/8"	3-1/8"	4'8-3/8"
236'6"	3-3/16"	3-1/16"	4'8-7/8"
248'9"	3-5/16"	3-5/16"	4'8-1/2"
227'5"	3-1/8"	3"	4'8-5/8"
209'9"	3-3/8"	3-3/8"	4'8-5/8"
188'6"	3-1/4"	3-1/4"	4'8-3/4"
171'	3-1/2"	3-3/8"	4'8-1/2"
149'5"	3-1/8"	3-1/8"	4'8-3/4"
131'7"	3-1/4"	3-1/8"	4'8-5/8"
110'3"	3-1/8"	3-1/16"	4'8-5/8"
100'6"	3-1/4"	3-3/16"	4'8-1/2"
83'7"	3-1/8"	3-3/16"	4'8-3/4"
79'	3-3/8"	3-1/4"	4'8-1/2"
73'7" Point of switch	3-1/4"	3-1/4"	4'9"
58'7" Heel " "	3-1/16"	3-1/16"	4'8-7/8"
41'10"	3-1/4"	3-1/4"	4'8-3/4"
**21'11"	3"	3"	4'8-7/8"
0'00" Point of frog	3-1/8"	3-1/8"	4'8-7/16"
*1/8" outward movement of rail			
**3/16" " " " "			

Discussion

Extra 373 South was moving at a speed estimated by the crew as 55 to 45 miles per hour on a compound curve to the right when the No. 1 pair of driving wheels of the first engine became derailed to the left. The maximum authorized speed was 45 miles per hour. The curvature was 5°58' and the superelevation was 3-1/8 inches; however, at the frog there was a section of tangent track 12 feet long. After the first engine became derailed



it continued forward a distance of 1,061 feet and then overturned. The second engine was derailed to the left at a point about 500 feet south of the point where the first engine was derailed. There was no defective condition of the engines and there was no indication of dragging equipment or of any obstruction having been on the track.

According to the statements of the enginemen of the first engine, as their train was approaching the point where the accident occurred the speed was about 40 miles per hour, the throttle was open, the reverse lever was in position for 25 percent cut-off in forward motion and they were maintaining a lookout ahead. The engineer said there was nothing unusual in the riding qualities of the engine, but all engines of this type seem to have a side-slipping movement on curves. When his engine was about 200 feet south of the connection-track switch-frog the tender started to bounce, and immediately afterward he placed the brake valve in emergency position and closed the throttle. A train-service employee who was in the booth on top of the tender of the first engine said that prior to the derailment there was no slack action between the two engines. He was facing the rear of the train and the first he was aware of the derailment was when the tender started to bounce after it passed the connection-track frog. The engineer of the second engine was killed in the accident, and the fireman of this engine was so seriously injured he could not be questioned.

After the accident, examination of the first engine disclosed that the No. 1 pair of driving wheels were the first wheels to be derailed. The counterbalance of the right No. 1 driving wheel was badly battered on its forward corner and the outer rim of the tire was badly scored. The counterbalances of the right Nos. 2, 3 and 4 driving wheels were battered to a lesser degree. The engine-truck wheels bore no mark of derailment.

The first abnormal mark on the track structure was a flange mark which appeared on top of the main-track guard rail at a point 3-1/2 inches north of the point of frog and 3/4 inch inward from the flangeway side. At a point 1-1/2 feet farther south it was 1-5/8 inches inward, and at the end of the guard rail 3 feet 1-1/2 inches south of the first mark it was 4-1/2 inches inside the west rail. At a point 9 feet 9-1/2 inches south of the north end of the first mark, a flange mark appeared on top of the high rail and at a point 5 feet farther south it dropped outside the rail. Throughout a distance of 535 feet southward, flange marks appeared intermittently on the tops of ties inside the right rail and on the outside portion of the base of the left rail. Throughout this distance angle-bar bolts were broken off at each joint. The low rail was kinked and the base of the high rail was broken at intervals averaging about 16 feet. Southward from a point 535 feet south of the first

mark the track was destroyed a distance of about 500 feet.

After the accident, the track was examined northward from the point of derailment a distance of 657 feet. The superelevation varied from 2-3/4 inches to 3-1/2 inches, and the greatest variation between two adjacent stations about 19-1/2 feet apart was 1/2 inch. The gage varied between 4 feet 8-1/4 inches and 4 feet 9 inches. At the point of derailment the gage was 4 feet 8-7/16 inches, and the superelevation was 3-1/8 inches. At a point about 6 feet north of the point of derailment the alignment changed from a curvature of about 6° to a tangent 12 feet long, which was followed by a curvature of 6°. The frog of a turnout to the high side of the curve was installed midway between the ends of this tangent. According to A.R.E.A. superelevation tables, the maximum safe speed on a 6-degree curve having a superelevation of 3-1/8 inches is about 46 miles per hour. Although the highest estimate of the speed was 1 mile per hour less than the maximum safe speed, the manner in which the right No. 1 driving wheel dropped on top of the guard rail and the fact the mark on the high rail began more than 9 feet south of the beginning of the mark on the guard rail indicate that the first engine was rolling laterally. The No. 1 driving wheel on the high side of the curve would bear heavily against the outer rail. The gage was about 3/8 inch wide immediately north of the point of derailment, the high rail was somewhat curve-worn, the flanges were considerably worn, and at a point about 22 feet north of the point involved the high rail could be moved outward under pressure a distance of 3/16 inch. A combination of these factors was sufficient to permit the No. 1 pair of driving wheels to move laterally far enough for the right No. 1 driving wheel to drop on the guard rail. After the right No. 1 driving wheel dropped on the guard rail both of the No. 1 driving wheels followed a tangential direction until the left No. 1 driving wheel dropped outside the high rail.

#### Cause

It is found that this accident was caused by excessive speed on a sharp curve having irregularities in surface, alignment and gage.

Dated at Washington, D. C., this fifteenth day of January, 1943.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.