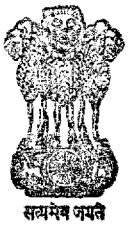

GOVERNMENT OF INDIA

MINISTRY OF TOURISM AND CIVIL AVIATION
(COMMISSION OF RAILWAY SAFETY)

RAILWAY ACCIDENT INVESTIGATION

REPORT

On

Fire
that occurred in a
Coach of No. 43 Darjeeling Mail,
at
CHANDANPUR STATION,
Eastern Railway
on
16th June, 1969

CORRIGENDUM

Page No.	Para No.	Line No.	For	Read
Title page	-	9	43 Darjeeling Mail	43 Up Darjeeling Mail
(i)	7	1	Engins	Engine
1	2(c)(iii)	2	Called were in	were called in
2	3(ii)	last	bucket	buckle
2	4(a)	1	atfer	after
4	9(b)(i)	2	magnatic	magnetic
5	9(b)(x)	2	so ket	socket
12	29(ii)	2	minuts	minutes
14	41	last	parralled	parallel
14	46(ii)	4	is	in

GOVERNMENT OF INDIA

MINISTRY OF TOURISM & CIVIL AVIATION

(COMMISSION OF RAILWAY SAFETY)

No. 1646/MAC-53. *Dated* : 8/9/1969.

From : The Additional Commissioner of Railway Safety,
North Eastern Circle,
6, Esplanade East,
Calcutta-1.

To The Secretary to the Government of India,
Ministry of Tourism & Civil Aviation,
New Delhi.

Through : The Commissioner of Railway Safety, *Lucknow.*

Sir

In accordance with Rule 10 of Railway Board's Notification No. 59-TTV/42/1 dated 11th April, 1966, I have the honour to report the results of my inquiry into the fire which originated in the 10th Coach, No. 1755 & subsequently spread to the 9th Coach, No. 1733, of 43 Up Darjeeling Mail at Chandanpur Station on Double Line Electrified Section of Howrah Division of the Eastern Railway on 16th June, 1969.

2. **Inspection of site and Inquiry.**—(a) On 18th June, in company with the Divisional Superintendent, Sealdah, Deputy Divisional Superintendent, Howrah, Deputy Chief Electrical Engineer, Calcutta and other Divisional Officers of Howrah Division, I inspected the site of accident and the two affected coaches at Chandanpur Station. The Clamping of vestibules in their opened position between two coaches and the light test, carried out on pit lines for detecting leaks were, however, seen by me at Sealdah on 20th June. Internal wiring of a coach, similar to the one in which fire broke out, was inspected at Howrah on the afternoon of 20th.

(b) Public having information bearing on the accident were invited through Press Notification to appear at the inquiry or communicate with me by post.

(c) The District Magistrate, Superintendent of District Police, Chinsurah and the Government Railway Police, Howrah, were duly notified of the inquiry which I commenced at Howrah on 19th June and continued upto 21st.

The officers present at the inquiry were :—

(i) Shri A. K. Bhaduri, Divisional Superintendent, Sealdah.

(ii) Shri N. D. Gupta, Deputy Chief Electrical Engineer, Calcutta.

(iii) Shri J. M. Ghosh, G. R. P. Inspector, Howrah, in the forenoon of 19th.

Other Divisional Officers called were in as required.

Neither the Civil Authorities attended the inquiry nor were they represented by anybody.

Evidence of 24 witnesses has been recorded and a letter received by the Divisional Superintendent from one of the passengers has been filed as part of the proceedings.

NOTE.—In this report the terms 'Right' & 'Left' 'Leading' & 'Trailing' and 'Front' & 'Rear', where used are in reference to the direction of the travel of No. 43 Up Darjeeling Mail Train.

3. **The Accident.**—On 16th June, 43 Up Darjeeling Mail, Sealdah to Farakka, was approaching Chandanpur station, 40·22 Kms. from Howrah, (47·41 Kms. from Sealdah) on the Double Line Electrified Howrah-Burdwan Chord Section of Howrah Division of the Eastern Railway, at a speed of about 80 Km/h on clear signals, when the passengers travelling in first class Coach No. 1755, 10th from the Engine, raised the alarm on noticing smoke and fire in some of the compartments of the Coach. Hearing this, the Coach Attendant who was in the 9th coach, No. 1733, rushed to the rear coach through the gangway, the vestibules being connected. On noticing smoke emerging out from the 3 leading compartments, whose doors were open at that time and flame above the doorway of 'B' compartment, he pulled the communication chord from one of the lavatories at the rear end of the coach. The Driver, seeing the vacuum gauge fall, brought the train to a stand at 13·50 hrs. between the Up Departure signals of the station with the Engine about 3000′ from the station and opposite T. S. post No. 41/3.

The fire, which broke out in the 10th coach, spread with great rapidity and progressed quickly through the gangway towards the first class Coach, No. 1733, immediately ahead of it, and burnt it out too as it could not be segregated in a short time due to difficulties in uncoupling on account of the vestibule arrangement. Both the coaches were damaged beyond repairs, their body shells badly warped all over and sagged by about 10″ at the centre, the internal fixtures and furnishings fully gutted but the undergears remained practically unaffected. The heat caused one of the OHE masts, nearest to the coaches, to bucket.

It was extremely fortunate that all passengers from the affected coaches escaped unhurt although they had to detrain hastily except one who, when enquired, did not report at site but later complained about minor abrasions on his leg, which he received while alighting, to the Assistant Medical Officer, Burdwan, who attended the train, and rendered first aid.

II. RELIEF MEASURES

4. (a) **Intimation of the accident.**—Shortly after the train stopped within the station limits of Chandanpur, the West Cabin Switchman saw smoke coming out of one of the coaches and advised of the fact to the Station Master as well as the Howrah Control at 14·00 hours. The latter promptly informed all concerned officers of the Division and quickly summoned emergency services.

(b) The local police at Chandanpur, on being advised by the Station Master and hearing the sound of the station Alarm Bell, reached the site within 10 minutes of the stoppage of the train.

5. **Medical Attention.**—As nobody complained of any injury, the question of medical aid at site did not arise. However, as mentioned earlier, one of the first class passengers was treated for minor abrasions on his leg at Burdwan.

Bamangachi Scale 'A' Medical Van with the Deputy Divisional Superintendent and a team of doctors reached Chandanpur at 16·37 hrs., shortly after the train had left.

6. A Fire Brigade from Chinsurah reached the site at 16.00 hours and those from Hoogly and Burdwan at 17·00 hours. They quenched the smouldering debris on the floor of the coaches with water.

7. **Restoration of lines.**—(a) Immediately the train stopped, the passengers travelling in the affected coaches were helped to detrain safely. By pulling the train forward, the portion of the train in rear of the 10th coach was then detached. The coupling between the affected coach and the coach immediately ahead of it could not be released as it first required the unfastenings of vestibule connections between them. By the time necessary implements were procured for the purpose, the fire had already progressed upto the gangway and the heat of fire made it impossible to disconnect the vestibule bellows. The coupling at the leading end of the 9th coach was then released and the train drawn ahead.

(b) When the fire had sufficiently subsided, the coaches were then drawn away in a siding at the station. The train, after attaching the two portions, finally left at 16·27 hours. The passengers were accommodated in other coaches and later transferred to First Class coaches that were attached at Burdwan.

(c) The traffic was interrupted to some extent as one of the OHE masts had buckled owing to heat of fire. The normal Double Line traffic, after temporary repairs, by electric traction was resumed at 03·00 hrs. on 17th June. While a few trains suffered detention, two Down trains, an Express and a Mail, were diverted to Sealdah *via* Bandel.

III. COMPOSITION OF TRAIN AND DAMAGE

8. No. 43 Up Darjeeling Mail consisted of 14 coaches hauled by a WP Class Steam Locomotive. The Marshalling order of the train was as under :—

(i) *Engine No.* 7274 *WP* : Built in U. K.; Put in service since 1950; Gross weight 170·18 Tonnes; Length over buffers 77′-10″; Equipped with VDO type speed indicator and recorder in working order; Fitted with headlight in working order.

(ii) *Coaches :*

Sl. No.	Type & Vehicle No.	Description	Type of body	Year built
1	TLR 5154	Third, Luggage and Brake.	Wooden body with outside steel panelling.	10/56
2	WGT 4087	Corridor Third	Anti-telescopic, all steel integrally welded	2/59
3	WGTY 4239	Corridor Third with Ladies.	Anti-telescopic, all steel integrally welded.	1/59
4	WGT 4240	Corridor Third with Ladies.	Anti-telescopic, all steel integrally welded.	1/59
5	WGT 4071	Corridor Third with Ladies.	Anti-telescopic, all steel integrally welded.	8/59
6	TPPH 5735	Postal Third	Wooden body with outside steel panelling	2/58
7	GSY 2518	Second Class with Ladies.	Anti-telescopic all steel integrally welded	1/58
8	FCQ 1322	First Class	Wooden body with steel panelling.	7/52
9	WFC 1733	Corridor First Class	Anti-telescopic all steel integrally welded	8/63
10	WFC 1755	Corridor First Class	Anti-telescopic, all steel integrally welded	4/63
11	WGT 4381	Corridor Third	Anti-telescopic all steel integrally welded	11/66
12	WGT 4236	Corridor Third	Anti-telescopic, all steel integrally welded	1/59
13	WGT 4128	Corridor Third	Anti-telescopic, all steel integrally welded	3/58
14	TLR 5604	Third Luggage	Anti-telescopic, all steel integrally welded	6/66

The train was fully vacuum braked. Its length, inclusive of Engine, was 1091′-10″ and weighed 758 tonnes. Based on standard data, the calculated brake power was 505·8 tonnes. the train communication with the Guard was functioning. All the coaches were owned by the Eastern Railway and were equipped with train lighting dynamos.

9. Coach No. WFC 1755

(a) *General construction details* :—

(i) *Body*—The ICF built coach was of integrally welded design with special anti-telescopic structure at the ends and put in service in 1963. It received POH in Railway's Liluah workshops on 25-11-68. Next POH is not due until November, 1969.

(ii) *Floor*—The trough floor, integrally welded with the structure, was covered with wood battens overlaid with linoleum. The lavatory wood flooring had a protective layer of oxychloride cement composition.

(iii) *Compartments*—There were 7 compartments, 5 of 4 berths and 2 of 2 berths each. The ceiling, partitions and side-walling consisted of plywood. The sliding doors of the compartments were of aluminium and so were the window frames and shutters.

(iv) *Berths*—Dunlopillo cushions, encased with rexine cloth, were laid on wooden berths fixed over steel frame. The upper bunks were generally of wood held to partitions by steel linkages and provided with Dunlopillo.

(v) *Vestibule*—They were of earlier design of scissor type frame support. The trailing end vestibule was blocked by a swing wooden door.

The conventional type screw coupling was fitted to either ends.

(vi) *The leading particulars of the coach are :*

Length over body	21337 mm
Length over buffers	22297 mm
Bogie wheel base	2896 mm
Bogie centers	14783 mm
Width over body	3250 mm
Wheel diameter	914 mm

(b) *Electrical equipment* :—

(i) It was equipped with a 29 L type 24 V. 100 amp. capacity dynamo, a auto cut-in and out switch, a magnatic switch for the control of lights only by the Guard and two 300 a.h., 24-V., lead acid batteries fitted to the underframe below the coach floor. The underframe wiring consisted of flame retarding V.I.R. insulated 250-V. grade copper conductor cables of various sizes.

(ii) The Paralleling main, Negative, Light Positive, Fan Positive, On and Off wires were terminated in a modified 24-way junction box fitted to the leading end panel at the right outside top corner. Excepting the Fan Positive, these wires from here ran from one end of the coach to the other and terminated in the 15-way junction box. The Paralleling Main and Negative consisted of V.I.R. insulated 19/2·24 aluminium conductor for some length and the remainder V.I.R. insulated cables, 37/·064 and 19/·064 copper conductors respectively. The others were of copper V.I.R. insulated and of sizes 19/·064, 7/·064 and 7/·064 for Light Positive, On and Off respectively. The Auxiliary Light Positive, Fan Positive and Auxiliary Negative copper V.I.R. insulated wires were of sizes 7/·064, 7/·064 and 19/·064 respectively, and they ran from the 24-way junction box to the 'A' compartment at the trailing end of the coach.

(iii) The Paralleling Main, Negative Light Positive, On and Off wires from the 24-way junction box were carried through conduits for some distance and terminated into the coupler socket at the left hand bottom corner of the end panel.

(iv) The through and the Auxiliary wires were carried between the water tanks over lavatories and then along the top of corridor partition between the ceiling and the roof.

(v) The branch wiring consisted of 3/·029 copper conductor, V.I.R. insulated. These, both positive and negative, were taken together in flexible metallic conduits which did not go all the way and were not earthed. The conduits were fixed on wooden blocks attached to carlines by clamps and each had rubber bushes at both ends.

(vi) Each 4-berth compartment had 4 roof lights, a night light, 4 berth lights and 4 fans and each 2-berth one had 2 roof lights, 2 berth lights, a night light and 2 fans. Each night and berth lights had individual tumbler switch whereas a pair of 2 roof lights had a commen switch. Each fan had a individual regulator. The switches and the regulators were mounted on the window side panel.

(vii) The various points in compartments were protected by fuse cut-outs, 9 for 4-berth and 5 for 2-berth compartments, mounted on wooden battens fitted to the corridor partition above the door ways and so was the case with the fan regulator resistances.

(viii) There were 4 lavatory, 4 door way, 4 corridor, 2 gangway and 4 embarkation lights. The point wiring, both positive and negative, for these was taken together through the flexible conduits. The fuse cut-outs for protecting the circuits were mounted on the cantrail above two enterance doors. At each of this location, there were 6 fuse cut-outs, each controlling a pair of lights except the gangway and the corridor lights which were individually protected.

(ix) All fuse cut-outs rated to blow at 5 amp. were provided in the positive circuit only.

(x) The 15-way junction box was fitted to the rear end panel in the recess from inside. 5 through and 10 wires, 5 each from the coupling so ket and the coupler terminated in it.

(xi) Protections as it should have been —

Each Battery Positive .	20 SWG Tinned copper	Rated to blow at 70 amps.
Dynamo Positive terminal	18 SWG Tinned copper	Rated to blow at 106 amps.
Dynamo Field circuit .	33 SWG Tinned copper	Rated to blow at 12/13 amps.
Paralleling Main & Light Position.	18 SWG Tinned copper	Rated to blow at 106 amps.
Auxiliary Light Positive .	20 SWG Tinned copper	Rated to blow at 70 amps.
Fan Positive in 24-way Junction box.	22 SWG Tinned copper	Rated to blow at 50 amps.
Lights Fans . . .	36 SWG Tinned copper	Rated to blow at 80 amps.

10. **Coach No. WFC 1733.**—(a) *General construction details :*

The general construction was identical to that of WFC 1755, both having been built by the ICF.

(b) *Electrical equipment* :—The equipment provided in this coach was generally identical to that of the coach No. 1755 and differed only in respect of the following :—

(i) Its Dynamo was 32L type with 120 amps. generating capacity.

(ii) The through wires *viz.* the Paralleling main, Negative, Light Positive, On and Off were carried centrally in a trough between the ceiling and the roof and held in position on wooden cleats attached to wooden battens fixed to the carline.

(iii) The branch wires were not taken through flexible conduits.

(iv) Berth lights were not provided.

11. **Damage.**—(a) The damage suffered by the two coaches, which were gutted in fire, is detailed in para 3.

(b) **Electrical damage—Coach No WFC 1755**

(i) *Dynamo.*—**The 29L, 24-V,** 100 amp. capacity dynamo was intact with belt and 16 SWG copper fuse in the positive and the 26 SWG copper fuse in the field positive circuits. As the field negative fuse pillar in the terminal base was broken and missing, it was therefore directly connected with the dynamo negative piller. The terminal base and its connections were healthy. All the internal parts of the dynamo were intact and unaffected.

(ii) *Battery.*—The coach was equipped with double batteries.

B-1. *battery.*—All the 12 lead acid cells and the battery boxes were intact. The battery fuse, normally provided in the positive lead, was bypassed. The insulation of the negative and positive leads was in good condition. The specific gravity was 1100.

B-2 *battery.*—All the 12 lead acid cells were charred and the battery boxes damaged as a result of heat from the coach shell when it sagged and more or less touched the battery box. The 16 SWG copper battery fuse was intact and so were the battery box lids, which were closed.

(iii) *Underframe wiring.*—The insulation of the underframe wiring which passed through conduit, was not affected.

(iv) *End panel.*—Both end panels were heated and the paint, as a result of it, had peeled off and the insulation of wiring on panels was completely burnt.

(v) *Auto-cut-in and cut-out switch.*—A single D-300 type switch was intact but the other along with the changeover mechanism missing. However, it was bypassed and made inoperative.

(vi) *Magnetic switch for the control of lights* and *fans*.—The intact LI-80 type switch was kept out of circuit. The light contactor was in position but that of the fan missing.

(vii) *Coach wiring*.—The coach wiring was almost completely burnt except for a short length between water tanks at both ends where only the insulation had perished. A few of the flexible metallic conduits carrying the branch wiring were in position and the rest had fallen down.

(viii) 15-*way junction box*.—A 15-way junction box, fixed on the end panel at the trailing end of the coach from the inside, was without cover. The through Negative, P.M., On and Off wires were connected to the central studs of the box with nuts. The through light positive wire was not provided. The Negative, P.M., On and Off from the coupler had been connected on the studs. The light Positive was not provided. All wires from the coupling wire connected excepting the Light Positive, On and Off wires which were found disconnected.

(ix) 24-*way junction box*.—The modified type of box, fitted at the right top outside corner of the leading end panel, had its front cover and all inside components intact. However, the ebonite board was charred and terminals and connections were found hanging. The insulation of the portion of 8 underframe copper wires, which passed through a conduit fixed on the end panel before terminating into the junction box, had perished. The portion of the wires from the mount of the conduit to the 24-way junction box had melted. The intact fuses in the box were :—

Aux. light positive	18 SWG copper.
Fan positive	18 SWG copper (Found blown).
P.M. Fuse (through).	16 SWG copper.
Light Positive (through)	18 SWG copper.

(x) *Lights*.—All the light fittings had fallen down on the coach floor.

(xi) *Fans*.—Out of 24 fans, 14 were charred and hanging from their supports. The rest were burnt and dropped on the floor along with the fan regulator resistances.

(c) **Electrical damage—coach No WFC 1733**

(i) *Dynamo*.—The 32L type 24-V. 120 amps. capacity dynamo was intact with belt and 16 SWG copper fuses in dynamo positive, dynamo negative and 26 SWG in field positive. All the internal parts of the dynamo remained unaffected.

(ii) *Battery*.—The coach was provided with two batteries :

B-1 *battery*.—All the 12 lead acid cells and the battery boxes with lid closed were intact. The 16 SWG copper battery fuse was found blown. The specific gravity was 1215.

B-2 *battery*.—The 6 lead acid cells provided in the leading battery box were unaffected and the equal numbers in the trailing end box charred. 16 SWG copper battery fuse was intact. The specific gravity of the undamaged cells was 1200.

(iii) *Underframe wiring*.—The underframe wiring, which led through conduits, was not affected.

(iv) *End panel*.—The end panels were heated and the paint, as a result of it, had peeled off and the wiring had completely burnt.

(v) *Auto-cut-in and cut-out switch*.—The D-300 type switch was intact.

(vi) *Magnetic switch for the control of lights and fans*.—The LL-80 type switch with most of the parts deficient was out of circuit.

(vii) *Coach wiring*.—Most of the coach wiring had burnt except for a short length between the water tanks where only the insulation had perished.

(viii) 15-*way junction box*.—It was fixed at the top centre on the inside of the coach on the end panel at the trailing end. It was without a cover. The Negative, P.M. and Light Positive through cables were not available, even though the studs, the sockets

and the links were intact. The intact On and Off through wires were connected to the junction box studs. On the coupler side, the Negative was found disconnected from the stud and the nut was found missing but all other wires were in position. All coupling wires were intact and properly connected excepting the coupling side negative cable which was not found, although the socket was connected on the stud.

(ix) 24-*way junction box.*—The modified 24-way junction box at the top outside corner of the leading end panel had its cover in position. The ebonite board was charred. The Light Positive and Negative cables for the coupler were found disconnected from their sockets. The intact fuses as found were :—

Aux. Light Positive	18 SWG copper.
Light Positive	18 SWG copper.
P.M. fuse (through)	16 SWG copper.
Fan positive	18 SWG copper.

(x) *Lights.*—All fittings had dropped on the coach floor.

(xi) *Fans.*—Out of 24 fans, 14 charred ones were hanging from their supports. The rest along with fan regulators resistances burnt and had fallen down.

(d) The cost of damage, which has been assessed at Rs. 2,77,316/-, detailed as under :—

	Rs.
(i) Rolling stock	2,74,816
(ii) Traction—O.H.E.	2,500
TOTAL	2,77,316

IV. LOCAL CONDITIONS

12. **Description of site.**—(a) Howrah—Burdwan Broad Gauge Double Line Chord Section form part of Howrah—Mughalsarai Trunk Route of the Eastern Railway. The entire section from Howrah to Mughalsarai *via* Grand Chord is equipped with 25-KV, AC Traction on overhead system.

(b) The kilometrage of stations referred to in the report, reckoned from Howrah *via* Chord are as below, there being 15 to 18 traction structure posts per kilometre :—

	Kms.
Sealdah	00.00
Howrah	00.00
Kamarkundu	32.93
Chandanpur	40.02
The site, where the train came to a stop	41/3 T.S.
Burdwan	90.40
Farakka	304.00

(c) The direction of line at the site where the train came to a stop is from South East to North West and the alignment is straight and on level grade for over 1 mile on either side of this spot. The country-side is flat and covered with paddy fields.

(d) *The track.*—The permenant way consists of 90 lbs., 210′ long welded rail panels laid on CST/9/wood sleepers with wood at joints to NW6 density on 10″ stone ballast cushion.

(e) *Permissible Speed.*—The maximum permissible speed on the section for passenger trains is 96 Kms. On the day of accident, there was no speed restriction on Kamarkundu—Chandanpur Block Section.

(f) *Signalling.*—All stations on the Howrah—Burdwan Chord are equipped with Standard III signalling and provided with Multi-aspect Colour Light Signals. Trains are worked on the Absolute Block System with Double Line Block Instruments on lock and block principle.

V. SUMMARY OF EVIDENCE

13. **Driver, Md. Sahood of 43 Up** drove the train from Sealdah, leaving right time. Before it was pulled up at 13.46 hours between the Up Departure signals of Chandanpur, the train had made the only booked halt at Dakshineswar. While passing through Chandanpur at a speed of about 80 Km/h on clear signals, he saw vacuum dropping on the gauge as some one had pulled the train communication chord. He helped in stopping the train by making normal application of brakes. Soon after the additional Fireman left the engine to reset the clappet valve, he looked back and saw lot of smoke coming out. It was inferred from this that one of the the coaches might have caught fire. He, therefore, started walking backward from the right and on the way met the Guard somewhere near the 6th coach, who informed him that a coach has caught fire. On his advice, he returned to the engine to carry out necessary shunting to isolate the affected coach. He then deputed the leading Fireman to protect the Down Main line. After necessary re-marshalling, the train finally left Chandanpur at about 16.27 hours. Although it was slightly cloudy and windy, the visibility was clear. The WP class of engine hauling the train was equipped with spark arrestor. All clear signals were exchanged by Cabinmen and Station Master enroute. None of the axle boxes ran hot.

14. **Leading Fireman, D. B. Mukherjee of 43 Up** generally corroborated the evidence of the Driver. On instructions from him, he protected the Down Mail line. The speed of train immediately before pulling the communication chord at Chandanpur was approximately 50 Km/h. He could not say whether it was cloudy or a clear day but it was certainly very hot and the visibility was good.

15. **Second Fireman, A. Paswan of 43 Up** stated that when the train stopped, he accompanied the Driver when he was going towards the rear to ascertain as to what happened. On the way he met the additional Fireman, who was earlier deputed by the Driver to set the clappet value, returning as he wanted necessary implements to disengage bellows of the vestibules between the two first class coaches for disconnecting the coupling between them. He accompanied the additional Fireman. Both of them tried to uncouple the 9th coach from the 10th which was on fire, but they could not do so as it was taking time to disconnect the vestibules and the fire had reached the gangway very rapidly and progressed quickly towards the 9th coach. It was windy and the day was very hot. The time interval between the stoppage of the train and attempt made to detach the 9th coach from the 10th was approximately 5 minutes.

16. **Acting Fireman Rajendralal of 43 Up** stated that, after the train was brought to a stop he was deputed by the Driver to go and set the clappet valve. When he reached the 10th coach, he observed that fire had broken out in it and the passengers were being helped to get out from the right. He detached the coupling between the 10th and 11th coaches before the train was pulled ahead. By the time he fetched necessary implements from the engine to uncouple the bellows of vestibules between the 9th and 10th coaches, the fire had already spread upto the gangway and the intense heat made it impossible to disconnect the vestibules before the coupling could be released. He then detached coupling between the 8th and 9th coaches and the front portion of the train was pulled ahead. None of the Cabinmen enroute exhibited any danger signal. The speed of the train was approximately 80 Km/h before it was pulled up. It was a bright hot day and the visibility was good.

17. **Divisional Mechanical Engineer (C&W), V. K. Kapur of Howrah** testified the damage suffered by the two affected coaches given in para 3. There was no sign of any heated roller bearing or seizing. In his opinion, in an emergency like this, it would take a minimum of 12 to 15 minutes, for one man to detach the connections between the frames of vestibules by climbing on buffers opening the clamps and/or loosening nuts, bolts, repeating the operation on the other side, pushing back the bellows and then uncouple the screw coupling between the coaches and that too on presumption that proper size spanners would be available on the locomotive to loosen nuts. If this work has to be done in a coaching yard, where properly trained staff with requisite tools available, then it would probably be managed in about 8 to 10 minutes.

18. **Guard, S. K. Mukherjee of 43 Up** stated that the train left Sealdah, right time, with requisite vacuum which was maintained throughout. He did not receive any complaint about fans or lights not functioning either at the starting station or at the only scheduled halt at Dakshineswar. While passing through Chandanpur at about 80 Km/h on clear signals, the communication-chord was pulled by someone on the train and it came to stop at 13.50 hours between the Up

Departure signals of the station. On alighting from the train, he started walking towards the front. When he had hardly reached upto the second coach from the rear, he met the coach attendant coming from the opposite direction who informed him that coach No. 1755, 10th from the front, had caught fire. He then directed the coach attendant to bring fire extinguisher from his compartment and also called the brakesman. When he approached the coach, it was full of smoke and fire was raging inside. Dense smoke prevented him from going in by the left rear door. He then helped the passengers to detrain safely. When he learnt from the additional Fireman, who came to the scene to adjust the clappet valves, that the Driver was also coming, he went ahead and advised the latter to return to the engine and wait for his signal to perform shunting for segregating the coach. As there was some difficulty of uncoupling between 9th and 10th coaches due to vestibuling arrangement, both of them were finally segregated from the rest of train composition. Although fire extinguisher was used, the fire was too intense to be controlled. The number of passengers in the train was approximately 600.

19. **Coach Attendant, Biswanath Chatterjee of 43 Up** was in charge of the two first class coaches No. 1733 and 1755, 9th and 10th respectively from the engine. The vestibules between the two coaches were connected. When the train was passing through Chandanpur, he was at the rear end of coach No. 1733 taking order for tea to be arranged at the next halt. While busy in this, he heard shouts of fire from passengers in coach No. 1755. When he rushed there, he saw smoke emerging out from the compartments 'G', 'F' & 'E', whose doors were open at that time. Proceeding further, he saw the panel above the doorway of compartment 'B' glowing red with flames. He then pulled the communication chord from one of the rear end lavatories. When the train stopped at 13.50 hrs. between Up Departure signals of Chandanpur, he alighted from the rear right side of the coach and rushed to the Guard's compartment to inform him about the incident. The Guard who met him on the way, directed him to bring the fire extinguisher from his brake; which he did. Then he helped passengers in alighting safely. It was not particularly marked whether the fans in coach No. 1755 were working at that time, nor could he see any smoke coming out from compartments 'C' & 'D' as the doors were closed. No complaint of defective working of fans was received right upto the time the train was pulled up. The lights were however, not switched on on the run. He was last in this coach half an hour before the incident. No electrical staff attended to fans and lights in the train at Sealdah platform before its departure.

20. **Station Master, S. P. Swarnakar, Kamarkundu** stated that he watched 43 Up pass his station at 13.45 hrs. but he did not see smoke coming out of any coach on the train nor anybody raising alarm.

21. **Chandanpur West Cabin Switchman, Abdul Wahid** stated that 43 Up passed his Cabin on through signals at 13.49 hours and was stopped between the Up Departure signals with the last coach within the Starter. After about two minutes, he saw from the Cabin dense black smoke above the roof of the fifth coach from the rear and five minutes later flames at the same place. The train came to a stop at 13.50 hours and finally left the station, after detaching the 2 coaches, at 16.27 hours.

22. **Station Master, K. P. Raha, Chandanpur,** while watching the 43 Up pass through his station from his office room, he did not see smoke coming out of any coach. On getting advice from the West Cabin at 13.52 hours that the train has been pulled up between the Up Departure signals and that a coach has caught fire, he rang station alarm bell. Collecting staff, fire buckets and fire extinguisher, he rushed to the site. By the time he reached there, the fire was so fierce that it was beyond the range of the fire extinguisher to control it. Arrangement was then made to segregate the coach from the train but the coupling between the 9th and 10th coaches could not be released in a short time as this required unfastening the bellows of vestibules first. By the time arrangement was made to do this, fire had already spread with rapidity upto the gangway. It was then arranged to segregate both the coaches. The train finally left his station at 16.27 hours. He was assured, when personally enquired from the passengers, that no one was injured. During his talk with some of the passengers travelling in the 10th coach, it was learnt that smell of burning rubber had preceded the breaking out of fire. The fire brigade, which arrived from Chinsurah at 16.00 hours, extinguished the smouldering debris on the floor of the coaches.

23. **Brakesman, N. Banerjee of 43 Up** stated that he first learnt of fire breaking out in a coach from the first class coach Attendant. He entered the affected coach through the right rear door and found it full of smoke and flames coming out from the left side. On the corridor side

which was to the right, no flames could be seen but it was, however, full of smoke. He was inside the coach for about 3 minutes before he went to the adjoining coach No. 1733 through gangway. He helped passengers in getting down safely.

24. **Head Constable, G. R. P., Sri A. G. Das of Chandanpur** stated that on getting information from Station Master that fire has broken out in one of the coaches of 43 Up, he rushed to the scene along with the other staff and helped the passengers in detraining. Necessary security precautions to safeguard the belongings of passengers were taken. None of the passengers complained of injury or loss of any property. One of the first class passengers, who did not disclose his identity, although asked for, stated that there were intermittent failures of fan working followed by bad smell of rubber burning before the fire actually broke out.

25. **Electrical Foreman, P. Narayan, Train Lighting Section, Liluah Workshops,** stated that, during the last POH of coach No. 1755, 19/2.24 gauge aluminium cables were used to make up deficiency from roof to 24-way junction box i.e. P.M. and Negative wires, 12 meters each and in both kent couplers using 4 meters long cables each for P.M. and Negative. Branch wires from auxiliary light positive to 13 light point cut-outs were renewed. 26 light and fan joints and 50 light and fan terminals were replaced. 2 embarkation light points were renewed. 24 new berth lights were provided. 9 sockets were crimped in 24-way junction box. 10 metres wiring of ROB relay was renewed and 10 sockets were soldered. A battery fuse was replaced. The repairs of running joints of dynamo positive, T joint in battery negative, 5 tapping joints of switchgear, 2 cable and terminal lugs, and 2 battery cell connections were carried out. After proper testing, the coach was released on 25th November, 1968 for service on obtaining fitness certificate from the neutral Train Examiner.

To questions, the witness replied : LL 80 type single contactor load switch was provided and connected in circuits for control of lights only; aluminium conductor cable of P.M. and Negative, Kent couplers and branch wires were joined to copper wires using cold method of jointings; this type of jointing was considered sound if it was done properly; however, loose joints may cause local heating; fuses were provided on the positive wires only; from the prototype coach No. 1756 which was examined at Howrah on 20th June, it seems that the Main and Auxiliary wires were fixed on the partition wall above the compartment doorways and were fixed on wooden battens; the branch wires from the Auxiliary wires in metallic conduits were led through metal flexible conduits between the cut-outs and the points; rubber bushes in metallic conduits were sometimes found missing from the coaches received in Shops for POH but all such deficiencies were made good. In some cases, insulation was found to have perished, particularly of branch wires and joints badly done by the running staff, mostly between Auxiliary and branch wires; in rare case jointing done in workshops was found loose; the flexible metal conduits carrying branch wires have not been properly earthed to coach bodies; the branch wires, about 1' to 3' in length from tapping points upto cut-outs are generally unprotected by fuse cut-outs.

26. **Electrical Chargeman, Train Lighting, A. K. Banerjee, Sealdah,** was responsible for the maintenance of Train Lighting equipment of 43 Up before its departure from Sealdah. When the coach No. 1755 was examined on the pit line before leaving Sealdah, it was observed that dynamo output adjusting nut missing and field fuse overheated, which defects were put right. Electrical defects observed in other coaches during their examination are detailed below :—

Coach No.	Defects
4128 WGT	Belt stolen.
4381 WGT	Dynamo field fuse burnt due to contact UR relay pitted.
2518 GSY	Battery fuse damaged by tampering.
1322 FCQ	Belt loose.
4071 WGT	Belt loose.
4240 WGT	Dynamo positive cable loose and overheated.
4239 WGT	Dynamo (29-L) armature commutator grooved and dirty.

All these were attended to before the rake was handed over to work as 43 Up.

Although the train left with 21 fans missing, there was no deficiency of fans, lights and fan switches in coaches No. 1755 and 1733. The lamp test did not reveal any leakage of current from any of the coaches on the train. All the fans and lights, whatever available were in working order. No repair work was carried out to wiring of coach No. 1755 during the 3 months period preceding the accident nor any leakage of current was observed.

To questions, the witness replied : On the pit line, generally the fuses in 24-way junction, box and those provided with dynamo being visually examined and from the experience if any of them was found to be oversize, it was replaced with the correct or nearest lower size ; fuses in cut-outs are checked only when any fans or lights are not functioning; when the racks return from other Divisions or Railways, it has been observed that incorrect size galvanised iron wires have been used as fuses in some cases; this has been so mostly with 18 and 14 Down rakes; no electrical repair was carried out to 43 Up rake on the platform before its departure from Sealdah.

27. **Deputy Chief Electrical Engineer, N. D. Gupte, Fairlie Place,** who surveyed the two coaches after accident, testified electrical damage suffered by them as narrated in para 10 (b) and (c).

It is defficult to establish the cause and pinpoint the exact location from the condition of the coaches. However, from the evidence of the coach attendant, who stated that the fire started on the top of the door of 'B' compartment of WFC 1755 (Fuse cut-outs for compartment branch wires had been located here and main wires as well as auxiliary wires passed in the vicinity) and from the evidence of GRP staff to whom some passengers of this coach had mentioned that they found fans to be intermittently working and stopping, it would appear that there was an intermitent electrical fault on the fan circuit.

RDSO have prescribed a leak test to detect the presence of earth faults in wiring. It was conducted on WFC 1755 at Sealdah before it left with 43 Up on 16-6-69. Apparently no fault was revealed. The Construction of WFC 1756, a coach similar to WFC 1755 and probably of the same series, was examined and leak tests were conducted to find out if any faults could remain undetected.

Flexible metallic conduits had been used for branch wirings, both positive & negative in WFC 1755 and WFC 1756. In WFC 1756, rubber bushes were provided at the ends of the conduits, to prevent damage to insulation due to chafing. There were, however, some locations where some of these were missing. This would give rise to a possibility of damage to the insulation of branch wires by chafing caused by the sharp edges of conduits, which were not solidly connected to the coach body with the result that if the insulation of any inside wire gets perished and touches its body, its presence may not necessarily be revealed because of imperfect electrical contact between it and the coach body. For this purpose the negative terminal of the battery was connected to the coach body and a test lamp between the positive point and flexible metallic conduits one at a time. It was noticed that in some cases the test lamp glowed indicating that the conduits were in metallic touch with the coach body and in other it did not on account of imperfect electrical contact between them. Where the contact is not proper between a conduit and the coach body when stationary but it might be established due to vibrations during its motion and *vice versa.*

Lamp tests were also carried out to establish whether they would indicate the presence of all faults. A piece of wire was connected to the negative terminal in the 24-way junction box and its other bare end was left in contact with the body of the junction box. The lamp was not lit, although a bare wire was in contact with the coach body. The failure to light up the lamp was on account of the improper contact between the bare wire and the junction box body due to the presence of some paint. It was successful when repeated after scrapping away the paint at the contact point. Obviously the results of tests are not reliable in all cases.

It was noticed that 18 SWG copper wire was used as a fuse in the Fan Positive circuit instead of 22 SWG wire, and it was found blown. There are about 75 fuses in a first class coach and all are not examined at the beginning of each trip. It is also experienced that fuses of incorrect sizes and metal are put on line.

It may be mentioned that a certain length of each positive branch wire from the auxiliary light positive and the fan positive, upto the branch wire fuse cut-out is controlled by the fuse either in the auxiliary light positive circuit or in the fan positive circuit. Whereas the current

carrying capacity of the branch wire of 3/0.029 is about 7 amp. the fusing current of the fuse in the auxiliary positive circuit is 70 amp and the fan positive circuit is 50 amp. And in the event of any fault on the length of the branch wire upto its fuse cut-out, it may carry the current beyond its safe capacity, even then the correct size fuse in the auxiliary light positive or the fan positive circuit may not blow.

NOTE.—Tests referred to in paras 4 & 5 were conducted in my presence and I am satisfied with the results and conclusions drawn therefrom.

28. The copy of the letter from first class passenger Shri K. K. Rahut, ex : Chairman Indian Tea Planters Association, Ex : Chairman, Jalpaiguri Municipality which was received under Divisional Superintendent, Howrah's No. 941/GA/69, dated 9th July 1969 is summaried below :—

"On 16th June, 1969, while travelling in Darjeeling Mail ex : Sealdah to Jalpaiguri, a major fire accident occurred in the 1st class compartment of a corridor system coach. At about 13.45 hours, when the train was in good speed and nearing Chandanpur Station, the occupants of A. B. C. & D Compartments of the 1st class coach, all of a sudden observed black poisonous smoke coming out from all the top ventilators in these Compartments. Presuming this to be on account of fire, they came out of their compartments and noticed that the top portion above the door-way of 'B' compartment was burning."

VI. DISCUSSION

29. **Time at stoppage of the train and breaking out of Fire.**—According to the Driver—para 13, the train communication chord, while passing through Chandanpur on clear signals, was pulled at 13.46 hours and it came to stop at 13.50 hours as noted by the Guard-- para 18. There is no doubt that the train was brought to a stop at 13.50 hours.

No precise time of breaking out of fire could be established for lack of evidence of passengers travelling in coach No. 1755. It could not have been more than 2 to 3 minuts prior to 13.46 hours when the communication chord was pulled from the coach. It is to be accepted that the fire must have broken in the coach at any time between 13.43 and 13.46 hours.

The speed of the train as indicated by the VDO chart was 80 Km/h when train communication was pulled.

30. From the evidence of all those who were travelling in the train and others, there is no doubt that the fire started in coach No. 1755, 10th from the engine. The coach No. 1733, 9th from the engine, also got involved into it as it could not be segregated due to difficulty in timely detaching it from the one that was affected as the vestibuling arrangement between them came in the way.

31. Of the evidence recorded, only that of the first class Coach Attendant and the first class passenger—paras 19 & 28, being the eye witnesses, is of some help to decide the seat of fire. While busy taking orders for tea at the rear end of first class coach No. 1733, shouts of fire raised by passengers travelling in adjoining first class coach No. 1755 were heard by the Coach Attendant. He immediately rushed there and saw smoke emerging from the compartments 'G', 'F' & 'E' whose doors were open at that time and glowing flame on the panel above the doorway of compartment 'B'. He ran to one of the rear end lavatories and pulled the communication chord—para 19. Shri Rahut, ex - Chairman, Indian Tea Planters Association, who was travelling in coach No. 1755 stated that the passengers travelling in compartments A to D saw black poisonous smoke coming out of the ventilators of the compartments. Presuming this to be on account of fire, they rushed out and saw the portion above door-way of compartment 'B' on fire—para 28. One cannot but draw irresistable conclusion from the evidence that the fire originated at the panel above the 'B' compartment doorway and subsequently spread with great rapidity over the entire coach and progressed quickly to the adjoining front coach through the gangway.

32. The location, where the fire first started, is such that the possibility of its being caused by any of the external agencies such as lodging of live coal from the engine, throwing carelessly lighted cigarettes by passengers and inflammable materials carried by some can safely be ruled out.

33. The G.R.P. constable stated to have heard some first class passengers saying that fans in compartment of the coach were working intermittently—para 24. The fuse cut-out for individual compartment branch wires were located on the panel of above the respective compartment doorway. The Main as well as Auxiliary wires passed in the vicinity. Flames were seen by the coach attendant on the panel above doorway of 'B' compartment. The Station Master, Chandanpur, heard passengers mentioning smell of burning rubber preceding the fire. The evidence suggests intermittent electrical fault on the fan circuit as lights were not switched on.

34. Incidence of severe fires on coaches are mostly electrical in origin and this is particularly true for all metal coaches. The coach body itself being a conductor provides path for short circuit current if another polarity is earthed at a different location in the coach or any other coach of the train. A single earth on a metal body coach, therefore, can be a potential fire hazard.

35. In accordance with I.E.F. regulations for buildings, fuses should be incorporated in both leads of unearthed systems to protect them fully when the current due to an earth fault does not pass through both the wires on a particular circuit but this immunity, however, is not extended to all metal coaches. As such a single protection on the positive side is not enough because conductors of different cross sections may be short circuited through the coach body. Moreover a fuse, when located too far away from the tapping point leaves a considerrable length of wire unprotected. Under these circumstances, the Auxiliary Main fuse with its considerably higher current rating is unable to afford any protection to the un protected part of the branch wire. With the existing lay out and specifications the branch wire insulation may be ignited without the auxiliary main fuse blowing.

36. In hot weather the temperature in the cable duct is of the order of 58°—63° C and in addition to this, as the current density in cable is exceeded, the insulation tends to perish rapidly thereby creating a serious fire hazard. Crossing of unprotected portions of wiring of opposite polarity is common and can become a potential fire hazard due to deterioration of insulation.

37. The provision of fire retarding insulation on a cable only ensures that it will not readily catch fire from external sources such as live cinder, unextinguished cigarette butts etc. In fact it will resist burning for short time even if exposed to naked flame. The bituminous compound used on fire retarding cable melts and serves to retard the progress of the flame over the insulation. The heat generated within a cable while carrying a heavy fault current evaporates the bituminous impregnation. Finally the insulation is dried so thoroughly that the whole length of VIR cable is ignited simultaneously and burns like any other combustible material. Once the insulation catches fire it spreads rapidly to other cumbustible materials in the vicinity.

38. Fuses of wire rating particularly in the auxiliary circuits, fan and light mains are a source of serious fire hazards. Originally these circuits were provided with finely rated cartridge fuses but due to widespread theft of equipment in the 24-way junction box copper strands have replaced cartridge fuses. Unfortunately copper strands do not have fine discriminating property of a properly designed cartridge fuse. Many depots use 16 SWG copper for all principal circuits because 7/16 copper cable was a previous standard and as such was easily available. Since the introduction of aluminium for coach wiring, now aluminium strands are used indiscriminately thereby worsening the situation.

39. On 22nd June, while waiting on Howrah platform to avail 5 Up, I saw an Electrical Fitter coming to attend the train with aluminium fuses of probably 16 SWG size or near about. According to him they were to be used in making up deficiencies in 24-way junction boxes. He had no other size of fuses. When questioned, he replied that he would use the same thick aluminium wires to replace any fan or light fuse found blown off. This leaves no doubt that maintenance practices are at variance and there is much room to tighten it up by intensive checks at all levels. In this particular case, it was seen that 18 SWG copper wire fuse, which was found blown, was used in the fan positive circuit instead of 22 SWG tinned copper wire. Cases are not infrequent of fuses of incorrect sizes being used by the line staff.

40. Thefts of kent couplers and junction boxes on a large scale have compelled the railways to use two loosely connected wires between coaches. The light and fan circuits, in the absence of magnetic light and fan switches, due to theft, are mostly energised by connecting the Paralleling

and light Main to the auxiliary circuits with thick pieces of wire thereby bye- passing the fuse altogether. With such an arrangement faults of opposite polarities in two different coaches further increase the risk of fire. Morever, in the event of the fault being confined to one coach a considerable amount of unprotected power is available from the two adjoining coaches to feed the fault.

41. Feeding a fault from various coaches may damage the insulation of the cables affected by a fault. The fuses on the feeding coaches may not blow as the current supplied by them is generally less than the rating of the fuse due to some drop in voltage. Thus only the fuse on the affected coach alone now protects the cable. The unprotected negative circuit by design, and the absence of fuses on the positive wire further increase the fire hazard on the parralled block system.

42. Theft of equipment may for a time leave a large number of wires without protective insulation. The pernicious practice of stripping the insulation for battery charging, although terminals for this purpose are provided, is very common. Admittedly attempts are made to protect the bared wire by taping but the latter can seldom give adequate protection because of inferior quality of insulating tape.

43. The construction of 1756 WFC, a coach similar to 1755 WFC and probably of the same series, was examined. It was noticed that flexible metallic conduits with rubber bushes at ends to prevent damage to insulation by chafing had been used for branch wiring in both the coaches. In some locations there were no such bushes in coach No. 1756 and it could not be verified in the affected coach as everything had perished but possibility of some of them missing cannot altogether be ruled out. Both the positive and negative line branch wires were carried in these conduits and as these were not solidly connected to the coach body, the usual lamp test conducted revealed that leakage of current in them could only be detected when there was contact with the coach body. It may be possible for the conduits to be not in contact with coach body when stationary but may do so on the run by vibration and *vice versa*—para 27.

44. Leak test, on the line prescribed by the RDSO with slight improved modification, was carried out to ascertain whether presence of all faults could be detected. For this purpose a piece of wire was connected to the negative terminal in 24-way junction box and its other bare end was left in contact with junction box case. It did not reveal the fault. The failure was on account of improper contact due to presence of some paint between the contact surfaces. It did show the fault when the test was repeated after scrapping the paint and applying little pressure on the cable contact point. It is also possible that bare wires may not come in contact with coach body while standing but they may do so while in motion due to whipping action. In such cases clearance of fault would remain undetected by the prescribed test which is generally carried out on pit lines. This clearly brings out that the results of tests cannot be fully relied upon as they do not always depict the actual condition—para 27.

45. Three days after the accident, on account of fire, a composite Ist & IIIrd class coach on 18 Down Sealdah-Pathankot Express had to be detached at Masagram, on the Chord Line between Burdwan and Sealdah. Subsequent examination of the coach revealed that 6'-0" main wires in compartment 'B' run along the centre of the coach below roof together with branch wires on either side up to end walls were burnt. The fuses in cut-out were, however, intact. Electrical faults were detected in two other coaches of the rake when tested on its arrival at Sealdah. But for the timely action in pulling up the train, the coach would have been gutted as in this case. The evidence in this case fully supports the contention of paras 34 & 35.

46. In my Report on the Fire on 17th Up Sealdah-Pathankot Express train which occurred on 13th April, 1968, I had recommended the change-over of the existing 24V lighting system by higher voltage system, preferably 110V, which is in use with EMUs, I repeat the same here for reasons set out below:—

The EMUs are all metal coaches and it is understood that there has been not a single case of fire on account of electric lighting wiring system although pilferage of lamps, fans and other fittings is equally prevalent. This obviously goes to prove the superiority of the lighting system is EMUs over that of the ordinary coaches. I would once again suggest that the Railway Board may give serious consideration to the problem and take decision in favour of change-over from 24V system to 110V system.

47. (a) The present system of train lighting operated at 24V DC and makes extensive use of aluminium cables in wiring. The low voltage appears to have been chosen for the system presumably on consideration of electrical safety. Aluminium conductors have been introduced in the recent past in place of copper, because of heavy incidence of thefts.

(b) This low voltage system with aluminium conductors has the following drawbacks :

(i) The system has to deal with comparatively heavy currents because of operation at low voltage. As heating due to passage of current, is directly proportional to the square of current, overheating at a bad joint or connection is inherent in the system.

In this connection extract from the report on the fire which occurred at about 05·48 P.M. on 15th August 1936, on a passenger train between Winchester and Micheldever on the Southern Railway (U.K.) is reproduced below :

"RECOMMENDATIONS AND REMARKS

There is perhaps a natural tendency to consider that a 24-volt installation involves risks which are trifling compared with an ordinary domestic installation of 230 volts, and it is evident that conditions are not altogether comparable; but, as far as the question of excessive heating of wires is concerned, the risks of a 24-volts installation, supplied by batteries of high capacity, are really greater, owing to the heavier currents which have to be dealt with at the lower voltage."

(ii) Joining aluminium conductors requires to be done under carefully controlled conditions to obtain satisfactory joints. Special tool and presses are required to make crimped joints. As many of the train lighting wires are run near the roof it is difficult to operate the special tools etc. Good jointing of cable is, therefore, very difficult in workshops and impossible on line where many a time train lighting staff may be required to make connections. Bad joints are therefore not uncommon and the incidence of the cases of overheating not negligible.

(iii) In the event of high resistance fault, the short circuit current may not rise to a value high enough to blow the protecting fuse in the 24 V system. As there are a large number of thefts of train lighting equipment, loose and bare wires are common and possibilities of occurrence of faults are more.

48. If the system voltage is raised to 110V it will be possible to eliminate many of the drawbacks of the existing 24V system and yet retain its advantage in respect of safety from shocks to a great extent. The higher operating voltage will reduce the current to about 1/5th of the value now being obtained in the existing 24V system. This will have the effect of reducing the heating at a bad joint to about 1/25th of what it would be in the existing system. The advantages that would be derived from the proposed system would certainly out-weigh the considerations such as increase in number of batteries per coach, new type of generators and considerable cost of conversion.

As a first step to switch over, it is suggested that all coaches now coming out of ICF or other manufacturing units should be equipped with 110V lighting system on a pattern similar to EMUs which have been immune from fire incidence so far.

49. The Railway Board while approving paras 7, 8 & 10 of the minutes of the XXIV meeting of the ESC held at Lucknow, R.D.S.O. in 1967 accepted that the existing wiring of the coaches may be modified to the revised wiring as suggested by R.D.S.O., *inter alia*, the complicated control-switches, the existing 5 core inter-vehicle couplers with 24/15 way junction boxes, guard control switches may be dispensed with. The single battery system may be introduced with immediate effect except for special coaches like the dinning cars, postal vans etc. where the electrical load may be heavy. The Auto cut-in switches may be replaced by blocking rectifiers. Iron clad switches may be provided to control the lights and fans and emergency coupler arrangements may be retained. The changes envisaged, in the wiring may be taken up, forthwith while the coaches pass through shops during normal P.O.H.

It is thus apparent that, in keeping with Board's above policy decision, coaches in future will be self contained, dispensing with inter coach couplers as a normal feature. This decision obviously is in the right direction as it will facilitate switch over to 110V TL system.

VII. CONCLUSIONS

50. **Cause of the Accident.**—On full consideration of the factual, material and circumstantial evidence, I have reached the conclusions stated below :—

(a) The accident was most probably caused due to electrical faults on the fan circuit of coach No. 1755 and a fault of opposite polarity in the same or some other coach or coaches. The current so caused could have overheated the wire and ignited the wooden supports in the vicinity.

(b) No individual staff could be held responsible for the accident as the fault developed on the run and could not have been detected earlier.

51. **Relief Measures.**—On inquiry at site, no passenger complained of any injury. However, one of them later reported to have received minor bruises while alighting from the train and was attended to at Burdwan by the Assistant Medical Officer who attended the train.

The track was not affected but one of the track structure post had buckled due to heat. During the period that was required to rectify the defect, running of trains on electric traction was suspended.

I am satisfied that the relief arrangements were as efficient as could be expected under the circumstances.

Yours faithfully,

(Sd.) G.S.PANDOR

27-8-69

Additional Commissioner of Railway safety,
North Eastern Circle, Calcutta.

GIPN—S1—2CRS70- Lucknow/70-27-5-71—500.

SUMMARY

1. Date	16th June, 1969.
2. Time	Between 13.43 and 13.46 hours.
3. Railway	Eastern.
4. Gauge	5'6".
5. Location	Km. 41/3—between Up Departure Signals of Chandanpur Station.
6. Nature of Accident	Fire in Train.
7. Train involved	43 Up Darjeeling Mail : 14 Bogie Coaches hauled by WP Engins No. 7274.
8. Approximate speed	80 Km./h.
9. System of operation	Absolute Block System.
10. Number of tracks	Double Line Section.
11. Gradient	Level.
12. Alignment	Straight.
13. Weather	Cloudy
14. Visibility	Good.
15. Casualties	NIL.
16. Cause	The fire was due to electrical faults on the fan circuit of coach No. 1755 and a fault of opposite polarity in the same or some other coach or coaches. The current so caused could have overheated the wire and ignited the wooden supports in the vicinity.
17. Person held responsible	None.