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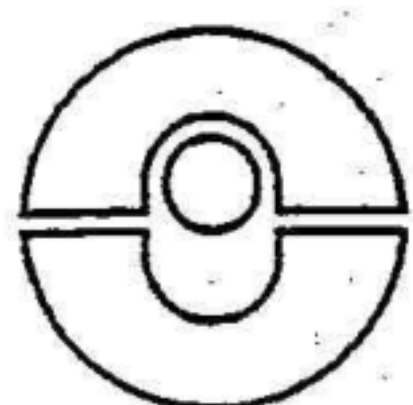
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3rd edition, 1.1.96

**Loudspeaker and telephone systems in RIC
coaches**

Standard technical characteristics



International Union of Railways

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Leaflet to be classified in volumes:

IV - Operating
IV - Transport stock

Amendments

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Preliminary remarks:

- Obligatory provisions are preceded by an asterisk: *

The double vertical line (||) in the margin denotes modifications introduced on the date shown at the foot of the page.

Enforcement of this leaflet is governed by the provisions listed under the heading "application" at the end of the document.

Note

This leaflet is part of a series which also includes:

Leaflet 440 - Loudspeaker systems in RIC coaches

Leaflet 558 - Remote control and data cable

Leaflet 751-3 - Technical regulations for international ground-train radio systems

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6 - Accessory equipment for remote control

7 - Telephone and radiotelephone call system

8 - Final remarks

Plate 1 : Allocation of conductors for the operation and remote-control of the loudspeaker equipment

Plate 2 : Characteristics of the amplifier with its microphone

Plate 3 : 8-pin coupler

1 - General

1.1 - The following provisions define the minimum conditions with which loudspeaker and telephone systems must comply in RIC coaches in order to:

- guarantee the satisfactory operation of the system in every respect when a large number of coaches from different Railways are coupled together to form an international train;
- ensure a quality of broadcasting which will satisfy the minimum requirements.

These regulations leave each railway concerned free to install the system in the way best suited to its requirements and to take advantage of rapid technical developments in this field.

The system accepted as standard is that which includes as many amplifiers as there are coaches with loudspeaker systems.

The system provides for utilisation of one line in accordance with Leaflet 558. Two of the four quads of this line shall be used for the loudspeaker installation and telephone links.

Within the RIC vehicle fleet, distinction must be made between:

- a) those vehicles which are only equipped with a loudspeaker/amplifier/microphone unit for messages over the public-address system,
- b) those vehicles which are equipped with a loudspeaker/amplifier/handset unit for messages over the public-address system and telephone links,
- c) those vehicles which, additionally to one of the above arrangements, are also equipped with a socket for plugging-in a portable unit for message or music broadcasting (incorporating in particular equipment for persons accompanying parties aboard special trains).

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* 1.2 - All RIC coaches equipped with a loudspeaker system shall include:

1.2.1 - Loudspeakers situated in all passenger areas and side corridor.

1.2.2 - A power amplifier.

1.2.3 - Wiring in the coach as per leaflet 558.

1.2.4 - A supply circuit with protective equipment.

1.2.5 - Remote control accessories.

1.2.6 - Loudspeakers must be fitted in the ceilings of WCs, above vestibules and in cabins for special staff.

*1.3 - All RIC coaches with loudspeaker systems and telephone call stations in accordance with point 1.1 b); 2 and 3, shall be fitted with the equipment listed in § 7.2.

*1.4. - All RIC coaches with loudspeaker systems and a point for connecting a portable public address and music broadcasting unit shall be fitted in addition with:

1.4.1 - A permanently fixed socket for connecting up other items of equipment (for example: magnetic tape-reader, etc.) for longer broadcasts.

1.4.2 - A two-way switch for the purpose of supplying modulated current either only to the coach containing the portable public address and music broadcasting unit or to all coaches on the train which are provided with a loudspeaker system.

1.5 - If the portable public address and music broadcasting unit is situated immediately beside a loudspeaker, it is recommended that it be possible to switch the latter off.

*1.6 - Plate 1 shows the basic layout with which installations must comply.

2 - Loudspeaker and power amplifier unit

*2.1 - The power amplifier and loudspeakers shall be considered as one unit as far as the audio and electrical requirements are concerned.

*2.2 - The input impedance of the power amplifier shall be at least 3000 Ohms in the frequency range between 100 and 8000 Hz.

*2.3 - The audio response curve, measured at the nominal input voltage of the power amplifier between 100 and 8000 Hz, shall not vary from the level at 1000 Hz by more than ± 3 dB.

*2.4 - The nominal (effective) input voltage of the power amplifier shall be 2V.

At this voltage, each loudspeaker shall produce a sound level (known as "normal level") of at least 90 dB measured in a soundproof room under the following conditions: the amplifier shall be connected to all the loudspeakers actually used in a given coach, with the measuring microphone placed along the centre line of the loudspeaker to be tested at a distance of 0.60 m from it.

The average sound level obtained without attenuation in compartments 1.20 m above ground level, with the nominal input voltage and a frequency of 1000 Hz, shall be adjusted to a value approximately 6 dB higher than that of the average ambient noise measured with the windows closed, when the train is running at maximum speed on the open track away from tunnels and bridges. This adjustment is dependent therefore upon the degree of soundproofing achieved by the builder of the coach.

*2.5 - The harmonic distortion of the sound wave, measured under the conditions mentioned above, shall remain at less than 8 % for frequencies of between 100 and 8000 Hz and for a power amplifier input voltage varying within the limits given in 3.7.

*2.6 - The background noise measured with a psophometer at the output stage of the power amplifier, the input of which is short-circuited and adjustment made to obtain the normal level, shall be at least 60 dB below this normal level.

*2.7 - The power amplifiers shall be equipped with a common input for speech and music. This input must be correctly balanced and insulated from the remainder of the equipment. The balance level must be at least 45 dB.

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2.8 - Power control for musical broadcasts

2.8.1 - It is recommended that the switch provided to control musical broadcasts from each loudspeaker should have at least five positions. The positions should correspond to:

- full power,
- 6 dB attenuation,
- 15 dB attenuation,
- 25 dB attenuation,
- off

It is recommended that a rotary switch without any neutral or stop position should be used, the five positions being distributed over a full 360°.

***2.8.2** - Such switches shall not work when spoken announcements of a general nature are made.

***2.9** - The loudspeaker circuits in a coach should be such that the sound level of any particular loudspeaker does not vary by more than 4 dB, irrespective of the positions of the control switches of the other loudspeakers in the coach.

3 - Microphone and preamplifier unit

***3.1** - The microphone and preamplifier unit in telephone call stations shall be used both for short spoken announcements and for telephone conversations.

***3.2** - The preamplifiers shall have an output impedance of no more than 20 Ohms.

***3.3** - The effective output voltage of the preamplifier shall be 2V for a normal speech level (which produces a normal average audio pressure of 1.1 Pa on the diaphragm of the microphone). The output voltage shall not vary by more than 3 dB, irrespective of the number of coaches in the train in which the loudspeaker system is in use, up to a maximum of 20 coaches.

*3.4 - The harmonic distortion limit measured at the output stage of the preamplifier shall be no more than 3 % for all frequencies between 300 et 8000 Hz. The measurement shall be taken with the automatic level control inoperative, with an output voltage of 2 V, the microphone being subjected to the average audio pressure of 1.1 Pa with a sound wave of virtually sinusoidal form produced by a standard loudspeaker.

*3.5 - The output of the preamplifier shall be balanced and well insulated from the remainder of the equipment. The balance level shall be at least 55 dB.

3.6 -Background noise level of preamplifiers

*3.6.1 - The background noise level of the preamplifiers shall be at least 50 dB less than the normal output voltage of 2V (measured when the input stage of the preamplifier is short-circuited).

3.6.2 - It is recommended that the background noise level should be at least 60 dB less than the normal output voltage.

*3.7 - The preamplifiers shall be fitted with a suitable compressor, in order to maintain the average output at a virtually constant level, irrespective of variations in sound level produced by the staff responsible for making brief spoken announcements.

This compressor shall be regulated so that the output voltage of 2V does not vary by more than ± 3 dB, when the sound level at the input stage of the microphone varies between ± 15 dB (A) in relation to the conditions mentioned in 3.3.

The compressor shall include a device with two time constants, i.e. the activating and recovery time:

- the first must come into play when the sound level increases, and last no more than 0.1 sec;
- the second must ensure that the automatic regulating device prevents a return to the initial sound level and last about 1 sec.

Under these circumstances, the harmonic distortion of the preamplifier must remain at less than 5 %.

3.8 - The characteristics of the microphone and preamplifier unit shall be within the limits laid down in Plate 2.

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*3.9 - The telephone must be fitted with a "press-to-speak" button. This button should be pressed to enable the operator's speech to be transmitted over:

- the public address system ;
- the telephone link with the driver;
- or the radio-telephone link with the central control point.

Every precaution must be taken to avoid audio coupling with adjacent loudspeakers.

*3.10 - Microphones shall be protected against background noise.

***4 - Portable public address and music broadcasting unit**

4.1 - The portable public address and music broadcasting unit must be suitable for use in coaches equipped for connection of such a unit.

4.2 - This unit shall be provided with a general switch to activate the loudspeaker system (marked M on the diagram in Plate 1).

4.3 - The unit shall also be provided with a hold-down push-button (marked P on the diagram in Plate 1) enabling priority to be given to broadcasts by microphone, when the button is depressed.

4.4 - The portable unit shall have an output impedance of no more than 20 Ohms with a constant input level.

4.5 - Their effective output voltage must not vary by more than 3 dB with a constant input level irrespective of the number of coaches in the train in which the loudspeaker system is in use, up to a maximum of twenty coaches. This voltage must never exceed 3 V.

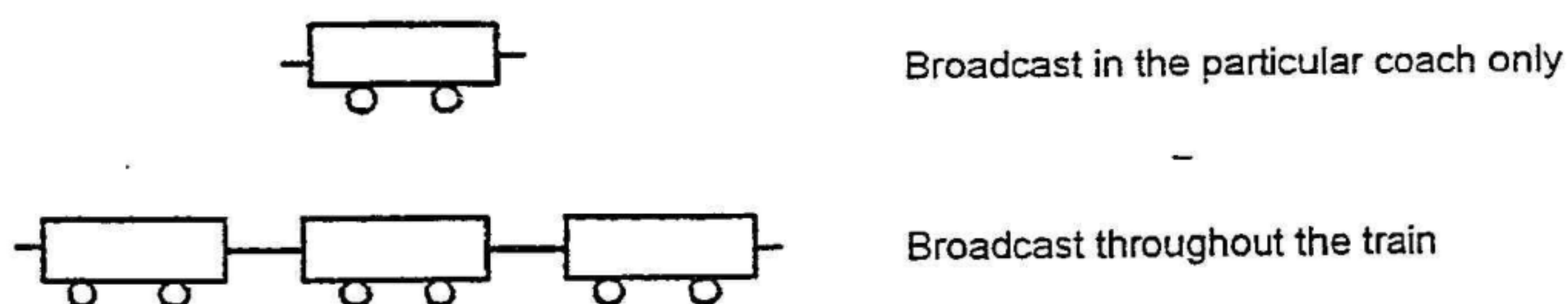
4.6 - The harmonic distortion of this equipment measured at the output stage shall not exceed 5 % for all frequencies between 100 and 8000 Hz, with an output voltage of 2 V.

4.7 - The output of the mobile unit shall be balanced and well insulated from the remainder of the equipment. The balance level shall be at least 55 dB with the normal output voltage; its background noise level shall be at least 50 dB less than the normal output voltage of 2 V.

4.8 - The portable unit must be provided with a plug so that it can be connected to the standard socket permanently installed in the coach.

4.9 - This socket must comply with the regulations laid down in Plate 3. When not in use, the socket must be protected by a hinged cover.

4.10 - The two-position switch, by means of which broadcasts from the portable unit can be made either in the coach in which it is installed alone or in all the coaches in the train equipped with a loudspeaker system (except when button P is in the "depressed" position), shall be situated on the broadcasting unit used for short announcements or in its vicinity; the position of the switch shall be indicated by the following symbols:



4.11 - The portable public address unit shall include a microphone and preamplifier unit complying with the regulations laid down in points 3.2 to 3.10.

*5 - Power supply

5.1 - The loudspeaker system must operate in accordance with Plate 1 when the voltage is between 18 and 33 V.

5.2 - The maximum power necessary in each coach for the remote control of the train loudspeakers shall be 25 W at 24 V.

5.3 - The maximum power needed in coaches with loudspeakers and equipped for connection of a portable public address and broadcasting unit shall be 50 W at 24 V in total.

***6 - Accessory equipment for remote control**

6.1 - Remote control shall be understood as meaning:

- a) switching the loudspeaker system on and off in all coaches,
- b) priority for short spoken announcements over long broadcasts.

6.2 - In order to ensure that the system works satisfactorily from all points of view when a large number of coaches from different countries are formed into an international train, the layout of the remote control equipment shall be standardised in accordance with the conditions laid down in Plate 1.

Currents for remote control must not exceed 20 mA with a nominal voltage of 24 V.

6.3 - Care must be taken to see that the exchange current between the batteries in different coaches is negligible.

***7 - Telephone and radiotelephone call stations**

7.1 - This chapter defines the minimum conditions to be complied with when establishing a telephone link with the tractive unit and a radio-telephone link with the central control point.

These provisions are compatible with those described in chapters 2 and 4 of this Leaflet. They also harmonise with those contained in Leaflet 751-3, which deals with telephone and radio installations on board through-working tractive units.

7.2 - Call stations on RIC coaches must be fitted with the equipment listed below in accordance with points 1.1 b), 2 and 3:

- a handset with microphone and receiver,
- a 4-conductor/2-conductor termination set for connecting the telephone to the 3/4 pair and transmitting the control voltage,
- three interlocking keys for selecting the following functions:
 - a) public address,
 - b) telephone link with the tractive unit,
 - c) radio-telephone with the central control point
- three indicator lights to show when these functions are engaged,
- a system for locking those functions in other coaches so that manipulation errors, short circuits and inversion of battery polarity can be avoided. The indicator light shall show when functions are locked.

7.2.1 - A system with two keys only, for functions b) and c) may be used. Function a) (public address) will in this case come into operation as soon as the speak button is pressed without depressing either of the two keys.

7.3 - The coach call station shall comply with Plate 1.

7.4 - The telephone link with the tractive unit shall always be established at the initiative of the train staff who after lifting the receiver shall press the key marked "telephone-locomotive" to select the function required. Conversation can begin as soon as the speak button is pressed (3.9). This causes a supply voltage (in accordance with point 5.1) to be applied to the 3/4 pair, wire 3 being negative and wire 4 positive.

The call station shall be put back in the rest position by replacing the handset in its cradle.

7.5 - The radio-telephone link with the central control point shall always be established at the initiative of the train staff, who shall depress the key marked "telephone-central control" in order to select the function required after lifting the receiver. Conversation can begin as soon as the speak button has been pressed (3.9). This causes a supply voltage in accordance with point 5.1 to be applied to the 3/4 pair, wire 3 being positive and wire 4 negative.

The call station shall be put back in the rest position by replacing the handset in its cradle.

This arrangement permits operation with either half-duplex or full duplex radio equipment.

7.6 - The voice circuits on the 3/4 pair shall have terminal impedances of 600 Ohms at each end.

There should be a separation of more than 20 dB between circuits in the 4-conductor/2-conductor termination set when balanced.

7.7 - The average modulation level of the call station in effective values shall be:

a) 2 V on the 1/2 pair, in accordance with paragraph 3.3;

b) on the 3/4 pair

- transmission 0.5 V

(on the radio channel the train staff voice signal peaks shall be transmitted in linear mode up to 0.8 V only; beyond that they shall be compressed and limited to about 1.2 V by the tractive unit's radio transmitter),

- reception 0.775 V

(on the radio channel the central control point signal peaks shall be received in linear mode up to 1.2 V only. Beyond that they shall be compressed and limited to about 1.6 V by the fixed radio transmitter).

7.8 - The strength of the control signal supplying the 3/4 pair via the 4-conductor/2-conductor terminator shall be a maximum of 50 mA for a nominal voltage of 24 V, so that it can switch on the radio and lock another coach.

8 - Final remarks

*8.1 - The average life of the unit should be at least 20 years in an ambient temperature of between - 25° C + 50° C.

8.2 - Railways are advised that electrical equipment in coaches should be fitted with suppressors to minimise interference in the loudspeaker system.

PLATES

Affectation des conducteurs pour le fonctionnement et la télécommande de l'installation de sonorisation

Adernbelegung für Funktion und Fernsteuerung der Lautsprecheranlage

Allocation of conductors for the operation and remote control of the loudspeaker equipment

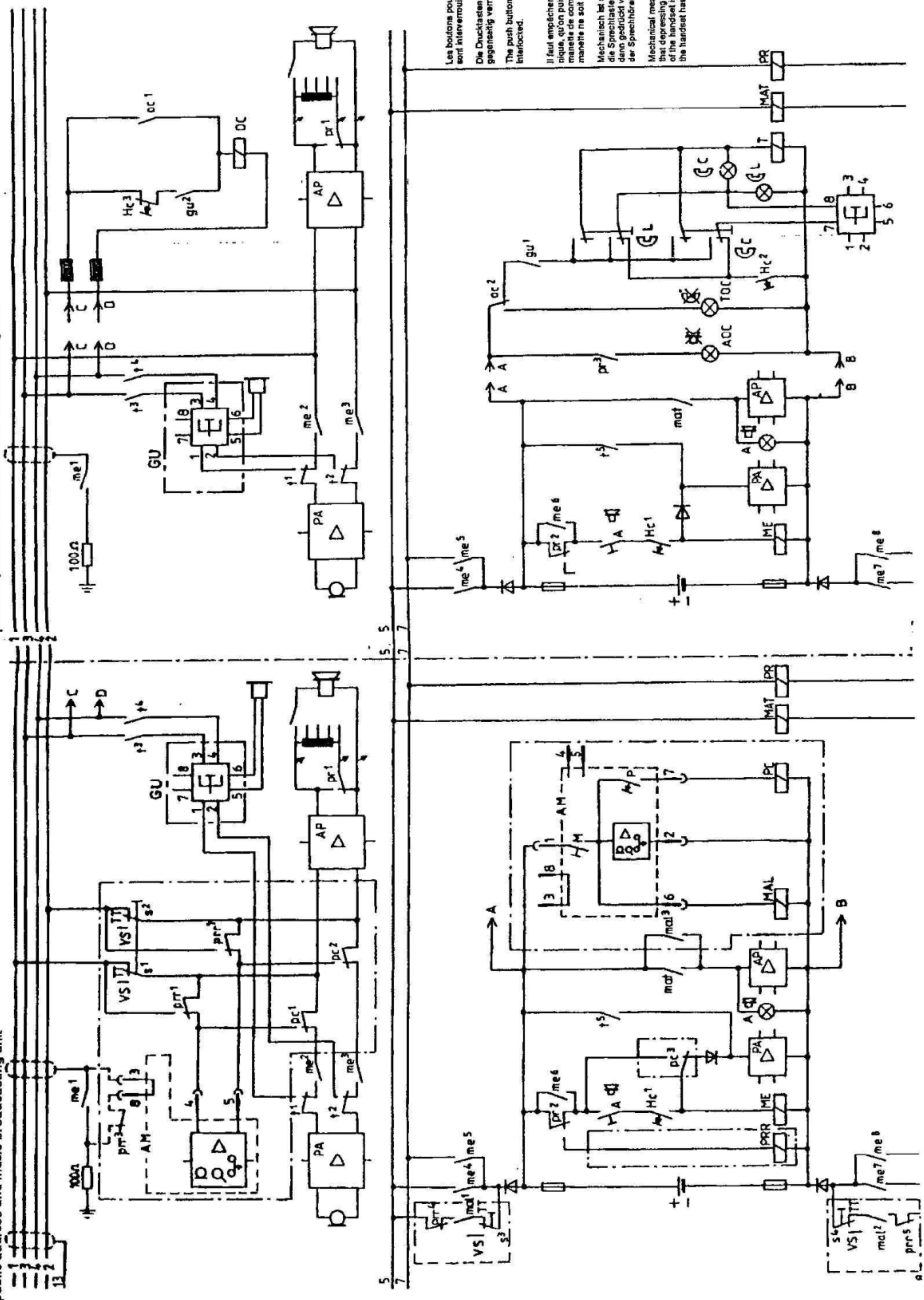
1,2	Circuit de sonorisation bas niveau NF - Verbindung zu den Endverstärken der Lautsprecher Power amplifier input circuit	Les chiffres correspondent à la numérotation des conducteurs et des contacts du coupleur de la ligne de télécommande et d'information selon la fiche n° 558 Die Ziffern entsprechen der Numerierung der Adern und Kontakte der Steckverbindung der Fernsteuer- und Informationsleitung nach UIC-MB 558 The numbers correspond to the numbering of the conductors and contacts of the connection of the remote control and information line as per to UIC Leaflet 558
3,4	Circuit pour le téléphone de train Verbindung für Zugfernsprecher Circuit for train telephone	
5,6	Circuit de télécommande des amplificateurs Fernsteuer-Verbindung zum Einschalten der Endverstärker Remote control circuit for amplifiers	
7,8	Circuit de télécommande de la priorité aux annonces Fernsteuer-Verbindung für Vorrang von Durchsagen Remote control for priority of announcements	

Légende - Zeichenerklärung - Key

GU	Commutateur de support Gabelschalter Cradle switch	PA	Préamplificateur Vorverstärker Preamplifier
HC	Manette du combiné Sprechtaste am Sprechhörer Push to speak key on handset	AP	Amplificateur de puissance Leistungsverstärker Power amplifier
T	Relais pour le téléphone de train Relais für Zugtelefon Relay for train telephone	MAT	Relais pour l'alimentation de l'AP Relais für die Stromversorgung des AP Relay for the supply to the AP
OC	Relais " téléphone de train occupé " Relais " Zugtelefon belegt " Relay " train telephone occupied "	PR	Relais pour la priorité des annonces Relais für die Priorität von Durchsagen Relays for priority of announcements
TOC	Voyant lumineux " téléphone de train occupé " Leuchtmelder " Zugtelefon belegt " Signal lamp " train telephone occupied "	ME	Relais émetteur destiné aux annonces Senderelais für Durchsagen Transmitting relay for announcements
C	Bouton-poussoir et voyant lumineux " téléphone au poste central " Drucktaste und Leuchtmelder " Fernsprechen mit der Funkzentrale " Push button and signal lamp " telephone with the central post "	AM	Appareil mobile pour la transmission d'annonces et de musique Mobiles Ansage- und Musikgerät Portable public address and music broadcasting unit Les numéros des fiches de l'AM correspondent aux numéros des connexions de la prise à 8 conducteurs (Planche 3) Die Nummern der Steckverbinder des AM entsprechen den Nummern der Kontakte der 8poligen Steckverbindung (Tafel 3) The numbers of plugs of the AM correspond to the numbers of the connexions on the 8-pole socket (see plate 3)
L	Bouton-poussoir et voyant lumineux " téléphone au poste locomotive " Drucktaste und Leuchtmelder " Fernsprechen mit dem Triebfahrzeugführer " Push button and signal lamp " telephone with the driver "	M	Commutateur de mise en service de l'AM Einschalter für des AM Switch for operating the AM
A	Bouton-poussoir et voyant lumineux " annonce " Drucktaste und Leuchtmelder " Durchsage " Push button and signal lamp " announcement "	MAL	Relais de mise en service de l'AM Relais zum Einschalten des AM Relay for operating the AM
AOC	Voyant lumineux " haut-parleurs occupés " Leuchtmelder " Lautsprecheranlage belegt " Signal lamp " loudspeakers occupied "	P	Bouton-poussoir pour les annonces prioritaires de l'AM Drucktaste für vorrangige Durchsagen vom AM Push button for announcements of priority from the AM
S	Commutateur pour la sonorisation - en position VS : " seule cette voiture " - en position TT : " tout le train " Umschalter für Beschallung - Stellung VS : " nur in diesem Wagen " - Stellung TT : " im ganzen Zug " Switch for acoustic irradiation - VS position : " in this coach only " - TT position : " in the whole train "	PC	Relais émetteur destiné aux annonces de l'AM Senderelais für Durchsagen vom AM Transmitting relay for announcements from the AM

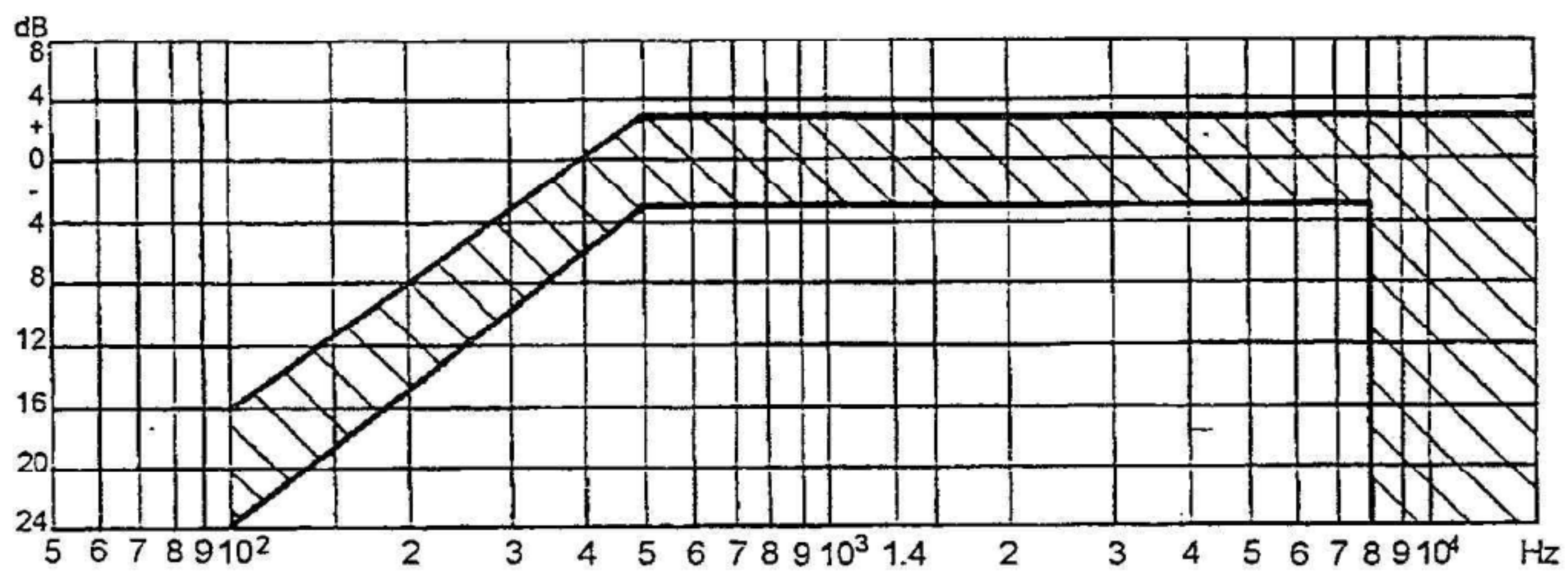
Voiture sonorisée avec appareil mobile pour la transmission d'annonces et de musique
 Beschallte wagen mit mobilem Ansage- und Musikgerät
 Coach equipped with loudspeaker system and portable public address and music broadcasting unit

Voiture sonorisée sans appareil mobile pour la transmission d'annonces et de musique
 Beschallte wagen ohne mobiles Ansage- und Musikgerät
 Coach equipped with loudspeaker system without portable public address and music broadcasting unit



Les boutons poussoirs A, L et C sont interverrouillés.
 Die Drucktasten A, L und C sind gegenseitig verriegelt.
 The push buttons A, L and C are interlocked.
 Il faut empêcher de manière mécanique, qu'on puisse appuyer sur la manette de combiné avant que la manette ne soit décrochée.
 Mechanisch hat sicherzustellen, dass die Sprechlaste am Sprechhörer erst dann gedrückt werden kann, wenn der Sprechhörer abgenommen ist.
 Mechanical means have to ensure that depressing the speak key of the handset is not possible until the handset has been picked up.

Caractéristique du préamplificateur avec son microphone
Kennlinie des Vorverstärkers samt Mikrofon
Characteristics of the preamplifier with its microphone



Application

With effect from 1 January 1996.

All Members of the Union.

Record references

Heading under which the subject has been studied:

- *Question 45/A/FIC* - Revision of leaflets.

8.7 - Approval of amendments to Leaflet 568.

(Joint Sub-Committee for Coaches: Paris, January 1990).

- *Question 45/A/23* - Transmission of information by train line (train bus)

(Traction and Rolling Stock Committee: Paris, November 1992).

- *Question 45/A/FIC* - Revision of leaflets.

- Approval of amendments to Leaflet 568.

(Joint Sub-Committee for Coaches: Paris, January 1993).

- *Item 8.5 (not on the programme)* - Loudspeaker and telephone systems in RIC Coaches - Standard Characteristics.

Additional conductors 14 to 18.

(Traction and Rolling Stock Committee: York, May 1993).

- *Item 9.7* - Leaflet 568 - Loudspeaker and telephone systems in RIC Coaches - Standard Characteristics.

(Rolling Stock Committee: Berlin, May 1995).

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