

POST OFFICE ENGINEERING DEPARTMENT

SPECIFICATION S 662D

FOR

THE ASSOCIATION OF PRIVATELY OWNED REMOTELYCONTROLLED DICTATION EQUIPMENT WITH PRIVATE AUTOMATICBRANCH EXCHANGES MAINTAINED BY THE POST OFFICE

I N D E X

- Section 1. GENERAL
2. ACCESS TO THE REMOTE DICTATION EQUIPMENT
- *3. CONTROL METHODS
4. CONNECTION OF REMOTE DICTATION EQUIPMENT
5. MAINTENANCE DEMARCATION
6. ELECTRICAL CHARACTERISTICS REQUIRED IN THE SPEECH PATH
7. ELECTRICAL CONDITIONS REQUIRED ON THE THIRD WIRE CONNECTION
8. AMPLITUDE OF DIRECT CURRENT SIGNALS
9. INSULATION AND PROTECTION REQUIREMENTS
- 9.1 Principles of Protection
- 9.2 Isolating Transformers
- 9.3 Isolating Relays and other Isolating Devices Containing Contact Spring-Sets
- 9.4 Isolating Capacitors
- 9.5 Isolation of Wiring and Terminals
- 9.6 Earthing of Remote Dictation Apparatus
- 9.7 Fuses and Control Switches
- 9.8 Enquiries on Protection Requirements
10. HISTORY

Notes:-

(a) The first issue of this specification carries a number without a suffix letter. When the specification is re-issued a suffix letter is added and for each subsequent issue the suffix letter is advanced by one.

(b) Except when the specification is completely re-written an amended paragraph is indicated by a star adjacent to the paragraph number and the particular portion amended is indicated by a vertical line in the margin.

1. GENERAL

This specification outlines the conditions to be met by privately owned remote dictation equipment connected to the automatic switching equipment at a PABX installation.

2. ACCESS TO THE REMOTE DICTATION EQUIPMENT

Access will normally be from a group selector level at the PABX.

The dictation equipment will be available to PABX extensions only. It will not be accessible for connection to PABX exchange lines.

*3. CONTROL METHODS

The Post Office will approve for connection to a PABX only those remote dictation systems which respond to one of the following methods of d.c. control from an extension telephone.

(a) Dial only

All operations of the dictation equipment are controlled by dialling selected digits.

(b) Dial and Single (Start/Stop) Press Button

A single press button associated with the extension telephone instrument, may be used to start and to stop the recording machine, all other operations of the dictation equipment being controlled by dialling selected digits.

(c) Dial and Single (Start/Stop/Playback) Press Button

A single press button associated with the extension telephone instrument, may be used to control the start, stop and playback operations of the recording machine, all other operations of the dictation equipment being controlled by dialling selected digits.

The single press button referred to in (b) and (c) may be provided in the handset.

The Post Office will supply and maintain any equipment needed at the extension telephone to provide the above methods of control.

No other form of control signal will be permitted, nor any system which requires proprietary equipment to be fitted at the extension telephone.

4. CONNECTION OF REMOTE DICTATION EQUIPMENT

(a) Each remote dictation circuit must be connected to the PABX equipment by means of three single wire conductors (see para. 7) in a manner approved by the P.M.G. Inductive methods of coupling cannot be permitted.

(b) Any leads required for mains power supplies to the remote dictation equipment must not be included in the cable used for connecting the dictation equipment to the PABX equipment.

5. MAINTENANCE DEMARCATION

The Post Office will cable out, from the PABX MDF, 3 wires for each dictation circuit together with a common earth and common battery wire. The battery wire will be a 50 volt negative supply from the PABX battery fused at 3A and must only be used for returning signals to the P.A.B.X. At each dictation equipment this battery supply should be fused at 1.0A. The wires will terminate on a terminal block supplied by the Post Office, and fitted in some convenient position adjacent to the remote dictation equipment. A corresponding cable from the dictation equipment will be run to this position by the dictation equipment manufacturer, or his agent, and will be connected to the terminal block by the Post Office. The terminal block will be the point of demarcation of maintenance responsibility, as between the Post Office and the dictation equipment manufacturer or his agent.

6. ELECTRICAL CHARACTERISTICS REQUIRED IN THE SPEECH PATH

(a) The remote dictation equipment will be controlled directly from the extension telephone circuit, and therefore the battery and earth returned from the dictation equipment over the speech wires to the P.A.B.X. must be the P.O. battery and earth referred to in section 5.

(b) The remote dictation equipment should present to the PABX equipment an impedance of approximately 600 ohms at a frequency of 800 c/s.

(c) The Post Office, while accepting no responsibility for the efficiency of recording, is interested to ensure that the quality and volume of the recording are such as to avoid the possibility of giving rise to unjustified complaints of the standard of transmission on Post Office circuits. The performance of the recording equipment will be tested by the Post Office using live and recorded speech, the level of which will be monitored at the dictation equipment input terminals using a Speech Voltmeter No. 3. This is a square law rectifier type Voltmeter with a 100 mS integrating time and calibrated in decibels relative to 1 volt. The signal levels referred to in paragraphs 6(c) - 6(f), below, are expressed in decibels relative to a signal level of 1 volt (r.m.s.) across the dictation equipment input terminals.

(d) Satisfactory recording should be possible in the frequency range 300-3400 c/s for signal levels between +6 db and -30 db at the dictation equipment input terminals. Any controls for adjusting the sensitivity of recording to this standard should be pre-set by the manufacturers and not available to the user. The amplifying, recording and playback equipment should not introduce sufficient noise to prejudice the intelligible reproduction of speech at the levels quoted.

(e) In order to limit the level of crosstalk recorded, it should not be possible to make an intelligible recording of speech or other signals at levels of below -60 db at the dictation equipment input terminals.

(f) The recording, when played back to line, should give an output at a maximum level between 0 db and -6 db, to be measured across a 600 ohm non-reactive resistor connected between the dictation equipment input terminals in place of the line. The recording should be intelligible, free from audible noise and hum and should be to the standard of normal telephone speech in the range 300-3400 c/s.

(g) Any audio frequency signal returned by the dictation equipment for supervisory purposes should have a frequency in the range 900 c/s - 2100 c/s, and be at a level not exceeding -12 db, when measured across a 600 ohm non-reactive resistor connected between the dictation equipment input terminals in place of the line.

7. ELECTRICAL CONDITIONS REQUIRED ON THE THIRD WIRE CONNECTION

For each remote dictation circuit, two of the three wires connected to the PABX equipment are required for the speech path, and to carry control signals from the PABX extension telephone to the dictation equipment. The third wire (H lead) connection is used to indicate to the PABX equipment whether or not the remote dictation equipment is available for use.

For PABX 3 and 4 using automatic access to the dictation equipment, the conditions to be applied to this wire by the dictation equipment are:-

(a) A 50V negative potential applied through a 250 ohm resistor to indicate that the dictation equipment is ready to receive a call. This battery signal must be obtained from the battery wire referred to in section 5.

(b) On seizure of the dictation equipment the battery signal referred to in (a) will be changed to an earth signal which must be obtained from the earth wire referred to in section 5.

(c) When the extension clears, the earth signal referred to in (b) will be disconnected i.e. open circuit, until the remote dictation equipment is ready for use again when the 250 ohm battery signal mentioned in (a) must be reapplied. The disconnection period will be of 800 m/s minimum duration.

For PABX1 and 2 using automatic access to the dictation equipment, the conditions to be applied to the H wire by the dictation equipment are:-

(d) A disconnexion to indicate that the dictation equipment is ready to receive a call.

(e) On seizure of the dictation equipment the disconnexion referred to in (d) will be changed to an earth signal which must be obtained from the earth referred to in section 5.

(f) When the extension clears the earth signal referred to in (e) will remain connected until the dictation equipment is ready for use again when the disconnexion referred to in (d) must be re-applied.

8. AMPLITUDE OF DIRECT CURRENT SIGNALS

The impedance of the dictation equipment input circuit must be sufficiently high to limit the current in the line between the PABX equipment and the dictation equipment to 100 mA.

9. INSULATION AND PROTECTION REQUIREMENTS

9.1 Principles of protection in the design and application of remote dictation apparatus are:-

(a) If the remote dictation equipment employs voltages higher than 100 volts a.c. (r.m.s.) or 150 volts d.c., measured between any conductors including earth, even though such voltages are not intentionally connected to line, then the remote dictation equipment must be completely "isolated" from line by at least one of the isolating devices specified in sub-sections 9.2 - 9.4 except as provided in (b) below.

Auto transformers, potentiometers, rectifiers and thermionic devices are not acceptable as isolating devices.

(b) The isolating devices referred to in (a) above may be omitted if the impedance of the source is sufficiently high to limit the current through a resistance load of 2,000 ohms to 10 mA a.c. (r.m.s.) or 50 mA d.c. when this load is connected directly to the terminals of the source.

There is no objection to the impedance of the source being virtually increased by the use of a resistor provided that:-

(i) The wiring and components connected to each end of the resistor are maintained at a separation at least equal to that of the terminals of the resistor, and

(ii) The resistor itself is of a carbon or similar type incapable of becoming low resistance due to internal deterioration.

(c) Flexibility points such as jack fields are not normally permitted in renter's private equipment.

9.2 Isolating Transformers. The insulation between:-

(a) Each winding to which is connected, or which generates internally, a voltage exceeding 100 volts a.c. (r.m.s.) or 150 volts d.c. or which is connected to components themselves not isolated from such a voltage, and

(b) All other windings, core and screen connected together shall withstand the application of a 50 c/s proof-test voltage of peak value $(1400 + 2V)$ volts for one minute (where V is the peak a.c. or d.c. value of the voltage concerned) subject to a minimum proof-test voltage of peak value 2,100 volts.

NOTE:- D.C. proof-test voltages may be used in lieu of a.c. provided that they are not less than the peak values of the appropriate a.c. test voltages/.

The insulation resistance tested at 500 volts d.c. shall be not less than 20 megohms after the above tests.

The core, screen and case of any isolating transformer shall be connected to a protective earth (see sub-section 9.6).

9.3 Isolating relays and other isolating devices containing contact spring-sets:- The insulation between any part carrying a voltage exceeding 100 volts a.c. (r.m.s.) or 150 volts d.c. (measured between any conductors including earth) and all other parts connected together shall withstand the application of a proof-test voltage as follows:-

(a) If the voltage carried by any part of the relay does not exceed 250 volts a.c. (r.m.s.) or d.c. apply 50 c/s proof-test voltage of peak value 1400 volts for 5 seconds.

(b) If the voltage to be carried by any part of the relay exceeds 250 volts but does not exceed 650 volts a.c. (r.m.s.) or d.c. apply 50 c/s proof-test voltage of peak value $(1400 + 2V)$ volts or 2,800 volts whichever is the less for one minute, where V is the peak a.c. or d.c. value of the highest voltage used.

The insulation resistance tested at 500 volts d.c. shall be not less than 100 megohms after the above test.

Contacts for switching mains supply circuits shall be in the "unearthed" lead.

When an isolating component has a contact connected to a voltage exceeding 100 volts a.c. (r.m.s.) or 150 volts d.c. as well as contacts isolated therefrom, the two sets of contacts shall be mounted in separate assemblies and a barrier of insulating material or earthed metalwork shall be provided between them unless the isolating component is protected by a cover which cannot be removed whilst the power is on.

The cores of isolating relays and the metal supports and framework of isolating devices containing contact spring-sets shall be connected to a protective earth.

9.4 Isolating capacitors. Any capacitor used for isolation from 50 c/s alternating voltages not exceeding 250 volts (r.m.s.) shall have a capacitance not exceeding $0.05 \mu\text{F}$. Other voltages and/or frequencies may be used provided the maximum current flow is restricted to 10 mA (r.m.s.). The dielectric of such capacitors shall be of mica or other material approved by the Engineering Department (Cn 1/2).

For isolation from d.c. voltages between 150 and 650V., the capacitor shall be either $10 \mu\text{F}$ or less or have in series with it a resistance such that the maximum charging or discharging current does not exceed 50 mA.

Electrolytic capacitors may not be used as isolators.

The insulation between terminals shall withstand the application of a 50 c/s proof test voltage of peak value 2,100 or $(1,400 + 2V)$ volts, whichever is the greater, for one minute, where V is the peak a.c. or d.c. value of the highest voltage used. D.C. proof-test voltages may be used in lieu of a.c. provided that they are at least equal to the peak values of the appropriate a.c. test voltages. After the above test, the insulation resistance shall be tested at 500 volts d.c. and shall not be less than 100 megohms.

If the case of the isolating capacitor is metallic, the case shall be connected to a protective earth (see sub-section 9.6).

9.5 Isolation of wiring and terminals. - Wiring and terminals associated with voltages in excess of 100 volts a.c. (r.m.s.) or 150 volts d.c. (measured between any conductors including earth) shall be adequately separated from any wiring not isolated from the Post Office line, unless sub-section 9.1 (b) applies. The clearance in air and creepage distances over insulation shall comply with B.S. 3861. If, however, both sets of wiring are of a type suitable for the higher voltage, a common wiring form is permissible. All reasonable steps shall be taken in the design of the equipment to prevent accidental contact (e.g. during maintenance operations) between the line and any isolated part of the circuit. This will normally entail the provision of suitable covers of insulating material or earthed metal around otherwise exposed parts, and the use of shrouded terminals. Terminals shall be clearly marked to reduce the danger of transposition of the line wiring with other wiring. If mains voltage is to be used on the equipment, the renter must ensure that the "L" and "N" connexions cannot be reversed.

9.6 Earthing of remote dictation apparatus. When it is desired to connect one side of a signalling power supply to earth, and when this signalling power supply will be connected to the PABX equipment, the earth used will be the earth wire referred to in section 5 and shall have no connexion with any earthing system used for protective purposes.

All metal work, including cores, screens, sheaths etc., not normally required to carry current shall be efficiently connected to the protective earth, (i.e. to the earth associated with the mains supply) and not to the signalling earth.

9.7 Fuses and control switches. A fuse of suitable rating shall be inserted in any power supply lead, other than neutral or earthed supply leads connected directly with earth. The current carrying capacity of the protective earth conductor must be such that on the occurrence of a fault of negligible impedance from a non-earthed conductor to adjacent exposed metal, a current corresponding to three times the rating of the fuse can flow.

9.8 Enquiries on protection requirements. If required, advice on the interpretation of Insulation and Protection requirements may be obtained from the Post Office Engineering Department, External Plant and Protection Branch (Cn 1/2) Procter House, 100/110 High Holborn, W.C.1.

10. HISTORY

Open Issue February 1961

ISSUE A

Completely re-written
November, 1962.

ISSUE B

Paragraphs 8 and 9.1(a) were accidentally omitted when the specification was advanced to issue A.

ISSUE C

Paragraphs 7(d), (e) and (f) added.
Minor amendments to paragraphs 3(c), 4(b), 7(a) 9.4 and 9.8.

ISSUE D

Paragraph 3(d) deleted. Feb., 1967

END OF SPECIFICATION

File Ref. S3/1/501/19/Gen
February, 1967

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