



Commonwealth of Australia

Australian Post Office

# SPECIFICATION

## 1104

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**PLEASE NOTE**

All references to  
"Australian Post  
Office" and "APO" in  
this Specification  
should read  
Telecom Australia.

**AUDIBLE SIGNALS FOR AUSTRALIAN  
TELEPHONE NETWORK**

**STATEMENT OF PLANNING OBJECTIVES**



COMMONWEALTH OF AUSTRALIA

POSTMASTER-GENERAL'S DEPARTMENT  
HEADQUARTERS

ENGINEERING PLANNING AND RESEARCH DIVISION

**APO SPECIFICATION 1104 ISSUE 2  
FOR  
AUDIBLE SIGNALS FOR THE AUSTRALIAN  
TELEPHONE NETWORK STATEMENT  
OF PLANNING OBJECTIVES**

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# AUDIBLE SIGNALS FOR THE AUSTRALIAN TELEPHONE NETWORK STATEMENT OF PLANNING OBJECTIVES

## 1. SCOPE

1.1 This Specification covers the general structure of the audible signals used in, and proposed for, the APO telephone network to indicate to subscribers and operators the progress of calls. Ringing current is also specified.

1.2 Machine recognition of service tones is not required at present but is seen as a definite future requirement.

\* 1.3 Except when otherwise specified, tones shall be virtually sinusoidal.

## 2. POWER LEVEL

\* 2.1 A power specified as X dBm<sub>0</sub> has an absolute power of X dBm at a point of zero relative level. If some other exchange reference point has a different relative level (e.g. -3 dBr), then the absolute level is changed accordingly (in this case to X-3 dBm).

The relative level at the reference point of a particular exchange should be ascertained from APO Specification 1116, according to the type of exchange concerned.

## 3. EXCHANGE SERVICE TONES - EXISTING

### 3.1 Dial Tone.

- (i) Dial tone is transmitted in the backward direction to indicate to the calling party that dialling should proceed.
- (ii) Dial tone shall have similar characteristics to those of a tone from a source giving one cycle of a  $154 \pm 10$  Hz voltage applied at  $30 \pm 3$  millisecond intervals and subjected to distortion similar to that imposed by a normal feeding bridge in a standard APO telephone exchange.
- (iii) The level of dial tone measured across the line terminals, with the line replaced by a 600 ohm non-reactive termination, shall be within the following limits:
  - (a) subscribers line terminals: -20 dBm minimum  
-15 dBm maximum
  - (b) junction or trunk line terminals: -15 dBm<sub>0</sub> minimum  
-10 dBm<sub>0</sub> maximum
  - (c) PABX line terminals: -20 dBm minimum  
-15 dBm maximum

### 3.2 Ringing Tone.

- (i) Ringing tone is transmitted in the backward direction to the calling party when a free subscriber's line is seized and the equipment is set for ringing. It is also transmitted when a free line to a manual assistance position has been seized.
- (ii) Ringing tone shall be a  $400 \pm 20$  Hz voltage modulated approximately 100 per cent at the ringing current frequency of 17 Hz nominal.
- (iii) Upon seizure of a line, continuous ringing tone shall be applied for 0.4 seconds and this shall be followed by interrupted ringing tone.
- (iv) Interrupted ringing tone shall have a periodicity of:
  - 0.4 seconds  $\pm$  10% on
  - 0.2 seconds  $\pm$  10% off
  - 0.4 seconds  $\pm$  10% on
  - 2.0 seconds  $\pm$  10% off
- (v) The level of ringing tone measured in the exchange at which the tone is injected, as an uninterrupted tone across the line terminals, with the line replaced by a 600 ohm non-reactive termination, shall be within the following limits:

\* See Clause 11

- (a) subscribers line terminals:                   -17 dBm minimum  
  -14 dBm maximum
- (b) junction or trunk line terminals:       -13 dBmO minimum  
  -10 dBmO maximum
- (c) PABX line terminals:                       -9 dBm minimum  
  -6 dBm maximum

3.3 Busy Tone.

- (i) Busy tone is transmitted in the backward direction to the calling party when the called number is busy. It is also applied under line lockout conditions.
- (ii) Busy tone shall be a 400 ± 20 Hz voltage interrupted at:
  - 0.375 seconds ± 10% on
  - 0.375 seconds ± 10% off
- (iii) The level of busy tone measured in the exchange at which the tone is injected as an uninterrupted tone across the line terminals, with the line replaced by a 600 ohm non-reactive termination, shall be within the following limits:
  - (a) subscribers line terminals:                   -17 dBm minimum  
  -14 dBm maximum
  - (b) junction or trunk line terminals:       -7 dBmO minimum  
  -4 dBmO maximum
  - (c) PABX line terminals:                       -9 dBm minimum  
  -6 dBm maximum

\* 3.4 Congestion Tone.

- (i) Congestion tone is transmitted in the backward direction to the calling party when congestion is encountered in the network.
- (ii) Congestion tone shall be a 400 ± 20 Hz voltage interrupted at:
  - 0.375 seconds ± 10% on
  - 0.375 seconds ± 10% off

and with every alternate pulse attenuated by 10 dB.
- (iii) The level of congestion tone measured in the exchange at which the tone is injected, as an uninterrupted tone across the line terminals, with the line replaced by a 600 ohm non-reactive termination, shall be within the following limits:
  - (a) subscribers line terminals:                   -17 dBm minimum  
  -14 dBm maximum
  - (b) junction or trunk line terminals:       -7 dBmO minimum  
  -4 dBmO maximum
  - (c) PABX line terminals:                       -9 dBm minimum  
  -6 dBm maximum

The measurement shall be made at the level of the first (unattenuated) pulse.

\* 3.5 Number Unobtainable Tone.

- (i) Number unobtainable tone is transmitted in the backward direction to indicate to the calling party that the number dialled corresponds to an unallotted level or number or a disconnected number.
- (ii) Number unobtainable tone shall be a 400 ± 20 Hz voltage interrupted at:
  - 2.5 seconds ± 10% on
  - 0.5 seconds ± 10% off
- (iii) The level of number unobtainable tone measured in the exchange at which the tone is injected, as an uninterrupted tone across the line terminals, with the line replaced by a 600 ohm non-reactive termination, shall be within the following limits:

\* See Clause 11

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| (a) subscribers line terminals:       | -17 dBm minimum<br>-14 dBm maximum |
| (b) junction or trunk line terminals: | -7 dBm0 minimum<br>-4 dBm0 maximum |
| (c) PABX line terminals:              | -9 dBm minimum<br>-6 dBm maximum   |

### 3.6 S.T.D. Tone.

- (i) S.T.D. tone is transmitted to both the calling and called parties on a subscriber dialed trunk call as soon as the parties have been interconnected but before charging is commenced.
- (ii) S.T.D. tone shall be a  $900 \pm 45$  Hz voltage interrupted at:
- 0.1 second  $\pm$  10% on  
0.1 second  $\pm$  10% off
- applied for 2 seconds  $\pm$  10%.
- (iii) The level of S.T.D. tone measured as an uninterrupted tone across the line terminals, with the lines replaced by 600 ohm non-reactive terminations, shall be within the following limits:
- |                        |                                    |
|------------------------|------------------------------------|
| (a) terminal exchange: | -17 dBm minimum<br>-14 dBm maximum |
| (b) transit exchange:  | -7 dBm0 minimum<br>-4 dBm0 maximum |

### 3.7 Coin Telephone Identification Tone.

- (i) Coin telephone identification tone is applied to calls incoming to manual assistance positions, from certain types of exchanges to indicate to the assistance operator that the call was originated at a coin telephone.
- (ii) Coin telephone identification tone shall be a  $900 \pm 45$  Hz voltage interrupted at:
- 0.075 seconds  $\pm$  10% on  
0.15 seconds  $\pm$  10% off  
0.075 seconds  $\pm$  10% on  
2.7 seconds  $\pm$  10% off
- (iii) The level of coin telephone identification tone measured as an uninterrupted tone across the line terminals, with the line replaced by a 600 ohm non-reactive termination, shall be within the limits:
- 17 dBm minimum  
-14 dBm maximum

### 3.8 Call Waiting Tones.

#### 3.8.1 For Manual Assistance Operators.

- (i) Operators' call waiting tone is applied to a manual assistance operator's circuit, if the position is in a preset condition, to indicate that an incoming call has been switched to that position.
- (ii) Operator's call waiting tone shall be a  $400 \pm 20$  Hz tone applied for 0.1 second  $\pm$  20%.
- (iii) The level of operators' call waiting tone measured across the operator's headset plug socket, with the headset replaced by a 600 ohm non-reactive termination, shall be within the limits:

-17 dBm0 minimum  
-14 dBm0 maximum

#### 3.8.2 For Subscribers and P.A.B.X. Extensions.

- (i) Subscriber's call waiting tone is applied to a specially arranged subscriber's line or to a P.A.B.X. extension, to indicate that another call is awaiting connection to that line or extension.

\*See Clause 11

- (ii) Subscriber's call waiting tone shall be a  $400 \pm 20$  Hz tone applied for  $0.2$  seconds  $\pm 20\%$  every  $10$  seconds  $\pm 20\%$ .
- (iii) The level of subscribers call waiting tone measured as an uninterrupted tone across the line terminals with the line replaced by a  $600$  ohm non-reactive termination shall be within the limits:
  - 20 dBm minimum
  - 15 dBm maximum

### 3.9 Pip Tone.

- (i) Pip tone is transmitted to the calling and called parties on a manually connected trunk call at  $2.8$ ,  $5.8$ ,  $8.8$  etc., minutes after commencement of timing to indicate to the parties that the end of a three-minute charging period is approaching.
- (ii) Pip tone shall be a  $900 \pm 45$  Hz voltage applied for:
  - $0.1$  second  $\pm 10\%$  on
  - $0.9$  second  $\pm 10\%$  off
  - $0.1$  second  $\pm 10\%$  on
  - $0.9$  second  $\pm 10\%$  off
  - $0.1$  second  $\pm 10\%$  on
- (iii) The level of pip tone measured as an uninterrupted tone across the line terminals, with the lines replaced by  $600$  ohm non-reactive terminations, shall be within the limits:
  - 17 dBmO minimum
  - 14 dBmO maximum

### 3.10 P.A.B.X. Trunk Offering Tone.

- (i) Trunk offering tone is applied to a P.A.B.X. connection whenever the operator enters a busy circuit (e.g. to offer an incoming call to the extension).
- (ii) Trunk offering tone shall consist of a  $400 \pm 20$  Hz voltage applied continuously.
- (iii) The level of trunk offering tone shall be within the limits of  $-30$  dBm minimum and  $-25$  dBm maximum when measured across a set of line terminals of the connecting circuit at which the tone is injected, with the line replaced by a  $600$  ohm non-reactive termination and with all other line terminals open circuited.

## 4. EXCHANGE SERVICE TONES - PROPOSED

### 4.1 Special Information Tone.

- (i) Special information tone is a standard international tone universally comprehensible and designed to invite the calling subscriber, in international automatic working, to get in touch with an operator in his country when he cannot understand a message aurally received.
- (ii) Special information tone consists of three successive signals, each lasting for  $0.33$  seconds  $\pm 0.07$  seconds. Between these tone signals there may be a gap of up to  $0.03$  seconds. This is followed by a silent period of  $1.0$  second  $\pm 0.25$  second.
- (iii) The frequencies used for the tone signals are:
  - $950 \pm 50$  Hz
  - $1400 \pm 50$  Hz
  - $1800 \pm 50$  Hzsent in that order.
- (iv) The level of each tone measured across the line terminals, with the line replaced by a  $600$  ohm non-reactive termination, shall be within the limits of:
  - 7 dBmO minimum
  - 4 dBmO maximum

### 4.2 Call Progressing Indicator.

- (i) Call progressing indicator will be transmitted to the calling party, to indicate that switching is proceeding, during setting up of a call.
- (ii) The composition of this signal has not yet been determined.

## 5. SUBSCRIBER'S APPARATUS SERVICE TONES - EXISTING

### 5.1 Recording Tone.

- (i) Recording tone is transmitted to both the calling and called parties to indicate that a recording device has been connected to the line and that the conversation is being recorded.
- (ii) Recording tone shall be a  $1400 \pm 100$  Hz voltage applied for 0.2 seconds  $\pm 20\%$  every 15 seconds  $\pm 20\%$ .
- (iii) The level of recording tone at the recorder connector unit terminals, measured across a 600 ohm non-reactive termination connected in place of the exchange line shall be within the limits of:
  - 6 dBm minimum
  - 3 dBm maximum

### 5.2 Coin Tone.

- (i) Coin tone is transmitted from a coin telephone to indicate to a manual assistance operator the value of the coins being inserted by the calling party.
- (ii) Coin tone shall be a  $900 \pm 90$  Hz square wave voltage applied as follows:

5 cent coin (1-pulse)	0.05 second $\pm 10\%$ on
10 cent coin (2-pulses)	0.05 second $\pm 10\%$ on
	0.05 second $\pm 10\%$ off
	0.05 second $\pm 10\%$ on
20 cent coin (4-pulses)	0.05 second $\pm 10\%$ on
	0.05 second $\pm 10\%$ off
	0.05 second $\pm 10\%$ on
	0.05 second $\pm 10\%$ off
	0.05 second $\pm 10\%$ on
	0.05 second $\pm 10\%$ off
	0.05 second $\pm 10\%$ on
- (iii) The level of coin tone, when measured as an uninterrupted tone across a 600 ohm non-reactive termination at the exchange, shall be within the limits of -17 dBm minimum and -12 dBm maximum.

### 5.3 Coin Collection Tone.

- (i) Coin collection tone is transmitted from certain types of coin telephones upon operation of the coin collect button to indicate to a manual assistance operator that the coins have been transferred from a coin receiving mechanism to the coin tin.
- (ii) Coin collection tone shall be a  $250 \pm 25$  Hz square wave voltage applied for 2.0 seconds  $\pm 10\%$ .
- (iii) The level of coin collection tone, measured across a 600 ohm non-reactive termination at the exchange, shall be within the limits of -17 dBm minimum to -12 dBm maximum.

### 5.4 Coin Refund Tone.

- (i) Coin refund tone is transmitted from certain types of coin telephones to indicate to the manual assistance operator that the coins have been returned to the user.
- (ii) Coin refund tone shall be a  $900 \pm 90$  Hz square wave voltage applied for 2.0 seconds  $\pm 10\%$ .
- (iii) The level of coin refund tone, measured across a 600 ohm non-reactive termination at the exchange, shall be within the limits of -17 dBm minimum to -12 dBm maximum.

### 5.5 Warning Pay Tone.

- (i) Warning pay tone is transmitted on S.T.D. calls from S.T.D. type coin telephones upon receipt of the meter pulse, which marks the commencement of the last paid period, to warn the user that additional coins are required if the call is to proceed beyond the next meter pulse.
- (ii) Warning pay tone shall be a  $900 \pm 90$  Hz square wave voltage applied for 0.5 seconds  $\pm 10\%$ .
- (iii) The level of warning pay tone, measured across a 600 ohm non-reactive termination at the exchange, shall be within the limits of -17 dBm minimum and -12 dBm maximum.

## 5.6 Final Pay Tone.

- (i) Final pay tone is transmitted on S.T.D. calls from S.T.D. type coin telephones, on calls where the metering interval is seven seconds or less, to warn the user that the paid time has expired and additional coins are required to prevent disconnection.
- (ii) Final pay tone is a  $900 \pm 90$  Hz square wave voltage connected upon completion of the paid time and maintained until the next meter pulse is received.
- (iii) The level of the final pay tone, measured across a 600 ohm non-reactive termination at the exchange, shall be within the limits of -17 dBm minimum and -12 dBm maximum.

## 6. SUBSCRIBER'S APPARATUS SERVICE TONES - PROPOSED

### 6.1 Echo Suppressor Disablement Tone.

- (i) This will be a machine recognisable tone fed from data transmitting equipment and recognised by the echo suppressor equipment which will then disable the echo suppressor.
- (ii) Echo suppressor disablement tone shall be a  $2100 \pm 21$  Hz voltage applied for a minimum of 300 milliseconds.

### 6.2 Calling Tone. Calling tone will be transmitted to line in the forward direction to indicate that a call has originated from a data station with automatic calling equipment.

- (i) 200 baud Data Modem. Calling tone shall be an interrupted  $980 \pm 6$  Hz voltage applied for:

0.5 seconds to 0.7 seconds on  
1.5 seconds to 2.0 seconds off

until such time as answering tone is received.

- (ii) 600/1200 baud Data Modem. Calling tone shall be:

- (a) an interrupted  $1300 \pm 10$  Hz voltage applied for:

0.5 seconds to 0.7 seconds on  
1.5 seconds to 2.0 seconds off

until such time as answering tone is received, if interface circuit 105 is on, or

- (b) an interrupted  $290 \pm 6$  Hz voltage applied for:

0.5 seconds to 0.7 seconds on  
1.5 seconds to 2.0 seconds off

until such time as answering tone is received, if interface circuit 120 is on.

### 6.3 Answering Tone. Answering tone will be transmitted to line in the backward direction from the terminating point to indicate that the call has been connected to a data station with automatic answering equipment.

- (i) 200 baud Data Modem. Answering tone shall be a  $2100 \pm 15$  Hz voltage applied for:

3.0 seconds to 4.0 seconds if duplex working, or  
2.6 seconds to 4.0 seconds if simplex working.

- (ii) 600/1200 baud Data Modem. Answering tone shall be a  $2100 \pm 10$  Hz voltage applied for:

3.0 seconds to 4.0 seconds if duplex working, or  
2.6 seconds to 4.0 seconds if simplex working.

NOTE: The APO intention is that echo suppressor disablement tone, calling tone, and answering tone shall conform to C.C.I.T.T. standards. The above figures are based on the current recommendations. It is also proposed the answering tone to be not applied until 2.2 seconds after ring trip (to avoid conflict with S.T.C. tone).



## 7. RINGING CURRENT

- (i) Ringing current is an alternating current signal used to produce an audible and/or visual signal. It is used in two forms:
  - (a) continuous ringing current
  - (b) interrupted ringing current.
- (ii) Upon seizure of a line continuous ringing current shall be applied for 0.4 seconds and this shall be followed by interrupted ringing current.
- (iii) The periodicity of interrupted ringing current shall be:
  - 0.4 seconds  $\pm$  10% on
  - 0.2 seconds  $\pm$  10% off
  - 0.4 seconds  $\pm$  10% on
  - 2.0 seconds  $\pm$  10% off
- (iv) Ringing current has a nominal frequency of 17 Hz. The actual frequency of ringing current supplied from automatic exchanges shall be between 15 Hz and 27.5 Hz. Ringing current fed from P.M.B.X. switchboards may have a frequency not exceeding 50 Hz.
- (v) The harmonic content of the ringing current should be such that the psophometric value measured at any subscribers line terminal at the exchange should not exceed 380 mV for all loadings of the ringing current source.
- (vi) The voltage measured at the subscriber's line terminals in the exchange shall not be less than 75 V with the ring source fully loaded. The no load voltage shall not rise above 100 V. Adequate protection should be included in the current feeding equipment to ensure reasonable safety to personnel.

## 8. ALTERATIONS TO EXISTING EXCHANGE SERVICE TONES

- 8.1 Dial Tone. If push-button telephone sets using voice frequency signalling are introduced into the network it may be necessary to change the existing dial tone.
- 8.2 Congestion Tone. It may be necessary to replace the present tone with a tone with alternate pulses of different frequencies but this has not yet been determined.
- 8.3 Number Unobtainable (NU) Tone. Difficulty is being experienced by subscribers in detecting the difference between NU tone and busy tone. To overcome this NU tone may be replaced by a recorded announcement or a new, more distinctive tone.

## 9. GENERATION OF TONES

- (i) At present ringing tone, dial tone, busy tone, number unobtainable tone and congestion tone, together with ringing current, are supplied from combined ringing and tone generators in accordance with APO Specifications 916, Ringing Machines and 917, Ring and Tone Racks.
- (ii) The generation of tones by electronic equipment would also be acceptable.
- (iii) The output characteristics of the tone supply must match the tone feeding arrangements associated with the speech path. The tone equipment should provide for contact wetting where necessary to ensure the reliability of the line feeding circuits.

## 10. MEASUREMENT OF TONE LEVELS

The measurement of levels for the purpose of this Specification shall be carried out with a true r.m.s. reading voltmeter of flat frequency response over the voice frequency band.

## 11. GENERAL

- 11.1 Amendments. This Specification replaces issue No. 1, which has been amended. Clauses containing important changes are indicated by an asterisk (\*).

END OF SPECIFICATION