

BRITISH TELECOM METERING SYSTEM

1. INTRODUCTION

* In order to raise charges from the originators of telephone calls, the country is divided into Charging Groups. Calls which terminate within the "home" or adjacent Charge Group are charged at local call rate whether they are dialled using local codes or STD codes. Calls to destinations within 35 miles are priced at the 'a' STD rate and calls extending beyond 35 miles are charged at the 'b' STD rate. The 'local', 'a' and 'b' charge rates vary according to the time of day with three rates, termed Full, Medium and Cheap, ie

Peak	Standard	Cheap	6pm - 8am	} Mon-Fri, Cheap at all other times.
		Medium	8am - 9am	
			1pm - 6pm	
		Full	9am - 1pm	

and rates are yet further appropriate to Class of Service ie Ordinary Lines or those with Coin Collecting Boxes. (CCB)

International calls are divided into 6 Charge Bands and are charged at the rate according to the Charge Band into which the destination country is included, coupled with the duration of the calls and the time of day ie Standard rate 8am - 8pm (Mon-Fri) cheap at all other times.

To levy the correct charge for any call it is therefore necessary for the equipment to know:

- (a) Class of Service
- (b) Destination
- (c) Time of Day
- (d) Duration of Call

2. GENERATION OF METER PULSES FOR LOCAL CALL TIMING.

Apart from a small number of experimental crystal-controlled tariff equipments, the pulse generation is accomplished by the Multi-Phase Pulse Supply equipment.

* The primary pulse source is the Clock 36, a pendulum device, fully described in Telecom Instruction E6 G0014. The clock delivers pulses at 1 sec, 6 sec and 30 sec periodicity. The 30 second pulse is used to drive a uniselector clock to control the change of tariff rates during the day. Changes to Dearer rates take place in the hour, whereas changes to Cheaper rates occur within $1\frac{1}{2}$ minutes prior to the hour. This prevents overcharging at tariff change times, allows the clock to be up to ± 29 seconds adrift and permits time for the removal of the rate in force, the changeover, and reconnection of the new rate.

The actual pulse for operating a customer's meter is approximately 250 millisecs in duration and is produced by the timing characteristics of relays, subject to an annual check. The periodicity of the timing pulses is unaffected by this circuitry. Phasing of the supplies occurs, this is to prevent the entire meter pulse loads occurring simultaneously causing a high discharge from the metering supply, so the distribution

is split into a total of up to 11 phases which are scanned sequentially by a cascade of relays.

The timing of the meter pulses is controlled from the 1, 6 or 30 second supplies from the master clock, Clock 36 and these are raised to 10 times the ultimately required rates. The periodicity of the transmitted pulses is checked at each tariff change time by operating staff. Accessing test numbers, Number Unobtainable Tone is received, interrupted by at the "10 times" pulse rate. The periodicity is checked by timing between tone interruptions with a stop-watch as described in Telecoms Instruction D2E 0060.

The phase distributions of the pulses are continuously scanned by a monitor which initiates a change to a standby equipment if a pulse is found to be missing.

The generation system is described in detail in Diagram Notes AT 60264 - Pulse generator.

AT 5543 - Multiphase
Pulse Supply

AT 5856 - Pulse
distribution

Maintenance checks are conducted according to Telecom Instruction E6R5319 (Weekly) E6R5320 (yearly) E6R5301 (year) and E6R5701 (3 yearly).

LOCAL CALL TIMING

When a telephone call is answered the initial meter pulse is returned from the final switching stage. This pulse operates the meter to commence charging and triggers the Local Call Timing (LCT) equipment. The "10 times" rate from the phased supply is counted by the LCT and every 11th pulse is extended to operate the meter. This method of counting affords the customer a free period (10%) in each subsequent metering period but safeguards against overcharging during the period following the initial answer meter pulse, and from close-spaced pulses which could occur at tariff change times, without elaborate and expensive circuitry. In addition the LCT contains a detector of Called Subscriber Clear, so that if, due to a fault or misoperation, the calling customer fails to clear, timing will cease after two metering periods.

STD Pulse generation.

Tariff pulse are derived from a Pulse Machine running at 3000 RPM \pm 1%. The pulse length, which has little effect on charges levied is within \pm 10% of 250 milliseconds. Machine speed is checked daily.

A full description of the Trunk Tariff Generation Equipment is available in Telecom Instruction A6 A0015. Maintenance attention is given according to Telecom Instructions E6R5317 (weekly) E6R5318 (weekly quarterly and half yearly). The pulse generation is at six times the required metering rate.

STD METERING

The tariff pulses from the generation equipment are distributed to Register Access Relay Sgts (RARS). According to the code dialled, a fee digit signal will cause the RARS to select the appropriate "6 times" tariff rate.

When a call is answered an initial meter pulse is returned to the meter to commence charging and also to start a counter in the RARS responding to the "6 times rate". The first "6 times" pulse is absorbed in starting the counter, so the first subsequent pulse to reach the meter occurs at 7/6 of the "6 times" rate. This

prevents possible overcharging between the initial and first subsequent meter pulses. There is no need to cater for further overcharging, as is done in the ICT, because prevention of additional pulses occurring at tariff change or equipment change times is catered for within the tariff equipment. A check on tariff pulse periodicity is made in a similar manner to that for local calls by the operators.

ISD Pulse generation.

This is identical to the STD system except that the pulses are of shorter periodicity and the Pulse machine runs at 2500 RPM. Maintenance attention is identical to the STD case. The pulses are generated at either the desired rate or "6 times" the desired rate.

ISD Metering

The answer condition to an international call will result in an initial meter pulse being extended from the RARS to the meter.

The pulses distributed from the pulse generator are connected to the International Call Timers (ICT). According to the international code dialled, the ICT will select the appropriate tariff pulse rate. The first tariff pulse is absorbed in the circuitry of the ICT to prevent overcharging between the initial and first subsequent pulses. Subsequent pulses will be extended to the meter at the desired rate being transmitted at the supplied rate, or divided by six if supplied at the "6 times" rate. A check on tariff pulse periodicity is made in a similar manner to that for local calls by the operators.

The Customers Meter.

The customers meter types 150A, 150AR, 150AS (Five digit) or 160A, 160AS (six digit) are constructed to Specifications T5321 (five digit) and T5342 (six digit).

Testing the customers meter.

At least once per annum, each customers meter connected to a working connection is routine tested to ensure that it functions to conditions more stringent than will be met in normal service. The number of pulses applied to the meter and the parameters of the pulse applied will depend upon the exchange switching system in which the meter is connected and the type of meter test equipment in use.

Details of the tests applied are given in Telecom Instructions E6R 5703, 5704, 5705, 5721, 5721, 5727 or 5743. E6R5743 is typical and is more numerous than other testers in the field.

Cleaning of meters, to aid photographic recording, is detailed in Telecom Instructions E6R5740 (3 yearly periodicity) and cleaning of glasses in meter windows is covered in Telecom Instructions E6R5741 (6 yearly). Typical of the test equipment is Tester TRT35 and rack mounted test circuit AT60007. A comparison of design, service and test parameters is given in the following table.