

CODE OF PRACTICE FOR THE METERING
OF ELECTRICITY TRANSFERS BETWEEN THE NATIONAL GRID COMPANY plc
AND PUBLIC ELECTRICITY SUPPLIERS
USING THE NATIONAL INTERIM METERING SCHEME

Superseded

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THE NATIONAL GRID COMPANY AND PUBLIC ELECTRICITY SUPPLIERS
USING THE NATIONAL INTERIM METERING SYSTEM

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Code of Practice for the Metering of Electricity Transfers
between the National Grid Company plc and Public Electricity
Suppliers using the National Interim Metering Scheme

FOREWORD

This document is one of a suite of Codes of Practice which supersedes Engineering Recommendation M24 - "Code of Practice for the Metering of Supplies from the Central Electricity Generating Board", issued in April 1973. It does not include arrangements between the National Grid Company plc ("NGC") or Public Electricity Suppliers ("PESs") and Generators, or the metering of customers of PESs or Generators, or the metering of Externally Interconnected Parties, which are dealt with in other Codes in this suite.

For the purposes of this Code, the terms "PES", "Generator" and "Externally Interconnected Parties" shall have the meaning given those expressions in the Pooling and Settlement Agreement ("PSA")

Details of the National Interim Metering Scheme are provided in a Functional Description issued by the CEGB Transmission Division in November 1988. The IMS will ultimately be replaced by a new National System, and an alternative Code of Practice will then apply for Electricity transfers in this category.

NGC Settlements Limited as Settlement System Administrator (as such term is defined in the PSA) shall retain copies of, *inter alia*, all Codes of Practice in this suite, together with copies of documents referred to in them, in accordance with the provisions of the PSA.

1. SCOPE

This Code of Practice determines the practices that shall be employed, and the facilities that shall be provided for the measurement of Electricity transfers between NGC and PESs and for recording measured quantities for Settlement. This Code complements and expands on the metering provisions (Clause 56) of the PSA, to which reference should be made.

In particular, this Code complements Clause 56 of the PSA (in respect of the provisions relating to accuracy of measurement) and the corresponding Metering Equipment Performance Specifications set out in Schedule 15 to the PSA. It should also be read in conjunction with the relevant Agreed Procedures for, *inter alia*, operation of the data collection systems as specified in Schedule 16 to the PSA.

In the event of an inconsistency between the provisions of this Code of Practice and the PSA, the provisions of the PSA shall prevail.

2. REFERENCES

The following documents may be referred to in the text:-

British Standard BS 3938: 1973	Current Transformers
British Standard BS 3941: 1975	Voltage Transformers
CEGB Standard 993619 (TPS6/19) 1985	Application of Metering to Tariff Circuits
CEGB Standard 993908 (TPS 9/14) 1983	Test Facilities for Current and Voltage Transformer Secondary Circuits
CEGB Specification EM21 (1982)	Electricity Meters, Induction Type
CEGB Specification EM24 (1980)	Cubicle for Accommodating Metering Equipment and Transducers
CEGB Specification EM27 (1986)	Static Energy Meters
CEGB Specification EM28 (1980)	Metering Information Tape Recording Equipment (MITRE)
CEGB Design Memorandum 099/101 (TDM 6/5) 1979	Definitions of Import and Export in Relation to Instrumentation and Metering
ESI STANDARD 50-18	Design and Application of Ancillary Electrical Equipment
ENGINEERING RECOMMENDATION M24	Code of Practice for the Metering of Supplies from the CEGB
CEGB FUNCTIONAL DESCRIPTION (ISSUE 1, November 1988)	The National Interim Metering Scheme
CEGB SPECIFICATION	: Modified MITRE Unit
CEGB SPECIFICATION	: OSME Unit
CEGB SPECIFICATION	: CM10 Unit

CEGB SPECIFICATION
(Issue 1, 17th March, 1989)

Communication Protocol
Definition for Links between
the IMS Projects and the
Central Data Collection System

PTS 261	The technical content of Primary Transmission Scheme 261, which sets out the IMS
PTS 271	The technical content of Primary Transmission Scheme 271, which sets out the FMS

Note: All references to Standards given in the text are to current versions. Where equipment is in use which was designed and built to earlier versions of these Standards, there is no implied requirement to update this equipment.

3. DEFINITIONS

Except where otherwise specified herein the definitions in British Standards 205, 1991 and 4727 Part 1, and British Standards for equipment shall apply, as appropriate. The following definitions, which also apply, supplement or complement those in the PSA and are included for the purposes of clarification.

3.1 *Electricity*

Active Energy and Reactive Energy

3.2 *Active Energy*

Active Energy is that part of the electricity supply capable of performing work. Unless otherwise stated it includes energy flows in both directions.

3.3 *Reactive Energy*

Reactive Energy is that part of the electricity supply which cannot perform work (the reactive voltampere hours). Unless otherwise stated it includes Reactive Energy flows in both directions.

3.4 *Active Power*

Active Power is the rate at which Active Energy is supplied.

3.5 *Reactive Power*

Reactive power is the rate at which Reactive Energy is supplied.

3.6 *Demand Period/Integrating Period*

The period over which Active Energy and Reactive Energy are integrated to produce Demand Values. For the IMS, the demand period shall be 30 minutes.

3.7 *Demand Values*

Average values of Active Power and Reactive Power over a Demand Period. The demand values are half hour demands and these are identified by the time of the end of the Demand Period.

3.8 *Meter Demand*

A demand registered by a single Meter.

3.9 *Total Demand*

A demand derived either from the Summation of one or more Meter Demands of similar quantities or from other total demands.

3.10 *Import*

An Electricity flow to the plant or apparatus of the PES from the plant or apparatus of NGC. (See also Appendix A.) The verb "Import" and its respective tenses shall be construed accordingly.

3.11 *Export*

An Electricity flow from the plant or apparatus of the PES to the plant or apparatus of NGC. (See also Appendix A.) The verb "Export" and its respective tenses shall be construed accordingly.

3.12 *Summation*

Summation means the algebraic addition of two or more flows of Electricity, either simultaneously, or for impulse summation, within the minimum number of impulses for correct operation.

For the purpose of addition, Import flows are termed positive and Export flows are termed negative.

3.13 *Commercial Interface*

For the purposes of this Code, the relevant physical locations at which commercial interfaces occur are as follows:-

At the lower voltage side of 400/275 kV connected transformers.

At 132kV circuits from 132kV busbars which supply more than one PES.

At circuits (system links) between two PESs.

3.14 *Metering Point*

The physical location at which Electricity is metered.

3.15 *Meter*

A device for measuring Electricity.

3.16 *Meter Register*

A device, normally associated with a Meter or summator, from which it is possible to obtain the amount of Active Energy, or the amount of Reactive Energy, that has been supplied in a circuit or circuits.

3.17 *PArh Meter*

A phase advanced reactive Meter used instead of Import and Export reactive Meters (VARh). Reactive Power/Reactive Energy is calculated in accordance with the following formula:-

$$\text{VAR} = (\sqrt{3} \times \text{Watts} - 2 \text{ PAr})$$

3.18 *Raw Data*

Demand Values collected from the Outstations and which have not been altered.

The values may have had automatic checks applied to them and be marked with flags describing their status relative to the checks.

3.19 *Processed Data*

Demand Values which have been amended by basic mathematical processes according to agreed algorithms.

3.20 *Verified Data*

Demand Values which, having been automatically checked, are considered satisfactory for commercial use.

3.21 *Modified Data*

Demand Values which are edited or substituted values where the raw data has been established as incorrect or missing.

3.22 *Reconciled Data*

Demand Values upon which monthly Settlement will be made, and which may include Validated Data where the Meter reading is carried out monthly.

3.23 *Validated Data*

Demand Values which are ultimately regarded as being correct on the basis of aligning with the Meter Register advances.

3.24 *Outstation*

The site equipment which receives and stores pulses from the individual Meters, may perform some processing of the data and transmits the metering data to the Collector Station on request.

3.25 *Interfacing Unit*

A unit which interfaces between the Meter output and the Outstation to provide two (or more) outputs (e.g. to provide an additional output from a Meter with only one set of output contacts).

3.26 *Collector Station*

The computer based equipment located at a few selected sites in the country, which collects data from the Outstations. Normally, this is carried out automatically each night but manual interrogation during the day is also possible.

The metering data are stored, tested, modified when necessary and transmitted on a daily basis to the central station.

3.27 *Central Data Collection System ("CDCS")*

The computer system located at a central point which contains a national database which is regularly updated from the Collector Stations to which it has dedicated communications links.

3.28 *Grid Supply Point ("GSP")*

The usual interface between the 400/275 kV Grid System and the PES Distribution System.

3.29 *Bulk Supply Point ("BSP")*

A Metering Point normally at 66kV or below forming the boundary between CEGB and Area Electricity Boards prior to the handover of 132kV Assets.

3.30 *PSTN/CTN*

The Public Switched Telephone Network/the appropriate ESI Corporate Telephone Network.

3.31 *The National Interim Metering Scheme ("IMS")*

The National Metering Scheme set out in PTS 261, in effect as at

the Effective Date and continuing until the FMS Date (as defined in the PSA).

3.32 *The National Final Metering Scheme ("FMS")*

The National Metering Scheme as set out in PTS 271, which comes into effect on the FMS Date.

4. MEASUREMENT CRITERIA

4.1 Quantities to be Measured

The outputs from current and voltage transformers shall provide, for the majority of circuits:-

- (i) Import kWh
- (ii) Export kWh
- (iii) Import kVArh
- (iv) Export kVArh

in certain cases (iii) and (iv) may be combined by using a Parhour Meter, or (ii) and (iv) may be omitted.

In addition, integration of the measured values over the Demand Period shall provide, for each circuit:-

- (i) average value of kW
- (ii) average value of kVA or kPA

4.2 Accuracy

4.2.1 Overall accuracy of equipment

Meters shall be so calibrated, taking account of errors due to measuring transformers, as to achieve the overall accuracy of Metering Equipment (comprising Meters and measuring transformers) at the point of measurement within the limits of error in the tables below:-

(i) Active Energy Meters

TABLE 1

Conditions of Test	Limits of Error at Stated Power Factor	
	Power Factor	Limit of Error
<i>Current expressed as a percentage of the rated measuring current</i>		
125% to 20% inclusive	1.0	+/- 1.0%
Below 20% to 10% inclusive	1.0	+/- 1.5%
Below 10% to 5% inclusive	1.0	+/- 2.0%
125% to 20% inclusive	0.5 lag and lead	+/- 2.0%
Below 20% to 10% inclusive	0.5 lag and lead	+/- 2.5%

(ii) Reactive Energy Meters

TABLE 2

Conditions of Test	Limits of Error at Stated Power Factor	
	Power Factor	Limit of Error
<i>Current expressed as a percentage of the rated measuring current</i>		
125% to 5% inclusive	Zero	+/- 4%
125% to 20% inclusive	0.866 lag and lead	+/- 4%
Below 20% to 10% inclusive	0.866 lag and lead	+/- 5%

These limits shall be maintained for the prescribed calibration period of the Meter, as defined in section 6.1.3.

4.2.2 Accuracy at the Commercial Interface

For the majority of cases (BSPs), the point of measurement is not at the Commercial Interface (GSPs).

For watthour metering, values will be adjusted to reflect the values as if measured at the associated GSP. Due to the nature of these adjustments, there will be an uncertainty between adjusted and "true" values. This is expected to increase the limits of error as set out above by up to +/- 1% in some half hour periods.

For varhour metering, no such adjustments will be made.

4.2.3 Accuracy of Records

The amount of Active Energy or Reactive Energy supplied during each declared Demand Period obtained from recorded readings shall be within +/- 1% (at full load) of the amount obtained by reading the appropriate register or registers at the beginning and end of the Demand Period.

4.2.4 Accuracy of Time Keeping

The long term time keeping accuracy shall be based upon the Outstation receiving a timing signal from the Collector Station which is synchronised to true time by using a Rugby (Warwickshire) radio clock.

The overall limits of error for the time keeping which must allow for failure to communicate with the Outstation for an extended period of 10 days shall be:-

4.2.4.1 the commencement of each Demand Period shall be at a time which is within +/- 10 seconds of the true time;

4.2.4.2 the duration of each Demand Period shall be within +/- 0.03% of the true duration.

4.3 Compensation for Measuring Transformer Errors

Compensation shall be made for the errors of current and voltage transformers in the Meter calibration.

Values of compensation criteria shall be recorded in the details submitted upon registration of the Metering System, when it is registered pursuant to the PSA and in relevant Connection and Use of System Agreements.

4.4 Compensation for GSP to BSP Losses

Compensation shall be made for Active Power losses between GSP and BSP as follows:-

- (i) calibration of the Meter or adjustment of the readings of registers shall take account of primary transformer losses;
- (ii) a fixed line loss factor shall be applied in CDCS software to values adjusted as in (i) above. Typically, the value of this factor will be 1.05, but calculated values relevant to each site may be initially submitted by a PES or subsequently reviewed and determined by the Executive Committee (as defined in the PSA).

Values of both adjustments shall be recorded in the details submitted upon registration of the Metering System, when it is

registered pursuant to the PSA and in the relevant Connection and Use of System Agreements.

5. FACILITIES TO BE PROVIDED

(Note: the Functional Description of the Interim Metering Scheme and CEGB Standard 993619 (TPS 6/19) give technical details which Metering Systems and Metering Equipment should comply with, to which reference must be made. However, basic details are reproduced below for ease of reference.)

5.1 Meters

Meters shall be in accordance with Specification CEGB-EM21 or EM27 and the following shall be provided on each circuit used to furnish the supply:-

- (i) Main Active Energy Meter for Import
- (ii) Check Active Energy Meter for Import
- (iii) Main Active Energy Meter for Export
- (iv) Check Active Energy Meter for Export
- (v) Reactive Energy Meter for Import
- (vi) Reactive Energy Meter for Export

It should be noted that where the possibility of Export occurs only under abnormal system conditions, (iv) may be omitted.

If no Exported Active Energy is possible, (iii) and (iv) may be omitted. In such cases, the Reactive Energy Meters may be combined in a Parhour meter, provided it is firmly established that the power factor will remain within the limits of measurement for such a Meter.

Meters shall be labelled according to the criteria set out in Appendix A.

5.2 Current Transformers

Current transformers for use with tariff metering shall preferably conform to the standards set out in BS 3938, Class 0.2, and have a rating of not less than 15 VA. Installations using existing instrument transformers may be retained subject to the requirements for system accuracy being met.

Metering current transformers shall be used solely for supplying the Meters.

The secondary current shall be either 1 or 5 amps.

Common return leads for two or more current transformer secondary circuits shall not be permitted. The total burden shall not exceed the rating of the current transformer.

5.3 Voltage Transformers

Voltage transformers for use with tariff metering shall conform to the standards set out in BS 3941, Class 1.0, and have a rating of not less than 100 VA. Installations using existing transformers may be retained subject to the requirements for system accuracy being met. Metering voltage transformers may be shared with other duties in so far as this does not affect accuracy of the Meters. The metering suite shall be fed by a separate, fused set of leads from the voltage transformer.

5.4 Interfacing Units

Interfacing units shall be designed and supplied according to relevant specifications in force. An indication of impulsing state shall be available on each unit.

5.5 Outstations and Data Collection

Existing Outstations shall be in accordance with CEGB Specifications (see section 2 above), and units shall be OSME, CMIO or modified MITRE. New or modified outstations shall meet similar performance and compatibility requirements.

Half-hourly demands of Active Energy Imported and Exported and Reactive Energy (or Parhours) Imported and Exported shall be made available in a manner suitable for processing by the appropriate information collection system.

5.6 Communication/Transmission Medium

Communications from a Metering Point to a Collector Station shall be via PSTN, or, occasionally, via CTN.

5.7 Ownership

Metering equipment shall normally be owned according to ownership of the primary equipment to which it is connected.

All metering equipment, metering ancillary equipment, instrument transformers, interface and control equipment in connection with the IMS will be registered into Settlement as required by the PSA. Each Metering System must have a Registrant and an Operator as required by the provisions of Clause 56 of the PSA. For the purposes of this Code, the terms "Registrant" and "Operator" shall have the definitions ascribed to them in the PSA.

Equipment installed, owned and maintained by a PES for the purposes of collecting Raw Data for internal use may, as at the Effective Date, be installed at a Bulk Supply Point. Such

equipment shall not endanger or interfere with operation of the IMS.

6. CALIBRATION AND TESTING OF EQUIPMENT

6.1 Meters

6.1.1 Initial (commissioning) calibration

Meters will have been supplied and calibrated according to the requirements of Specification CEGB - EM21 or EM27 as to accuracy, to the relevant requirements of that Specification and with errors biased to take account of voltage and current transformer errors and, where applicable, primary transformer losses.

Where available, the results of routine tests carried out in accordance with the relevant sections of such specifications will be made available, in accordance with Clause 56.9.3 of the PSA, with other records as in section 6.1.2 below.

6.1.2 Periodic checking and recalibration prior to the Effective Date

(a) Background

Metering Equipment will have been subject to routine inspection and recalibration under procedures established by the CEGB. These procedures, and the periods attributable to particular Meter types for recalibration, have varied between CEGB Field Engineering Units.

(b) Prior to the Effective Date

Records relating to these periodic checks or recalibrations shall be transferred by the CEGB before the Effective Date to the Operator of the Metering System who will make them available to the Registrant and/or the Settlement System Administrator as required by the provisions of the PSA.

6.1.3 Subsequent checking and recalibration

It shall be the objective, within three months of the Effective Date, for the Settlement System Administrator to check and affix his seal to that Metering Equipment required to be sealed pursuant to the PSA. In this context, checking shall include a thorough inspection of Metering Equipment and connections thereto.

Historic records will indicate priorities in subsequent Meter recalibration, and the Operator shall provide

schedules of proposed recalibration. Site checking and calibration will continue in accordance with the Tables below except that the need for further recalibration will be reviewed within six months prior to the FMS Date.

Records of inspections and work carried out will be kept to a form approved by the Settlement System Administrator.

TABLE 3 - Site Checking

Site checking of Meters shall continue to be carried out with the following frequencies from the date of the last site check:-

<u>Manufacturer</u>	<u>Meter Type</u>	<u>Test Frequency</u>
Ferranti	FLF	3 years
	FMF	5 years
	FNF	5 years
GEC	E72F	3 years
C&H	FN	2 years
	KTA	2 years
L&G	(all)	5 years

Otherwise, Meters shall be recalibrated as in TABLE 4 below.

TABLE 4

Periodicity of recalibration

The following recalibration periods shall be adopted:-

<u>Manufacturer</u>	<u>Meter Type</u>	<u>Period (years)</u>
Ferranti	(FLF)	3
	(FMF)	6
	(FNF)	10
GEC	E72F	6
L&G	All	10
C&H	(FN)	3
	(KTA)	3

6.1.4

Tests following Disputes

Where site tests are required to settle a dispute, the method (injecting into measuring circuits) as specified in Clause 56.15.2(a) of the PSA should be adopted, where possible. See also Appendix B.

6.2 Measuring Transformers

6.2.1 Initial Calibration

The IMS will use existing measuring transformer equipment, which will have been supplied with known characteristics within the specifications of relevant British Standards to allow calibration of Meters to ensure overall system accuracy within the limits laid down in this Code of Practice.

Records of these characteristics will be included with those records referred to in section 6.1.2 above.

6.2.2 Periodic Calibration

Calibration checks on measuring transformers within the anticipated time for which the IMS will be in operation is not considered practicable or necessary in those cases where calibration records are readily available. In those cases where no current calibration records exist, recalibration will be carried out.

Physical inspections of equipment and connections will be carried out as in section 6.1.3 above.

6.3 Test access to Metering Points

Where provided, test terminal blocks in accordance with CEGB Standard 993908 (TPS 9/14) shall be used to facilitate Meter testing and voltage and current transformer monitoring on site. Otherwise, existing arrangements will continue.

6.4 Data logging and processing equipment

6.4.1 Initial (Commissioning) Tests

Existing equipment for data logging and processing will have been supplied and tested according to CEGB specifications including type, routine works and routine site tests. Access to the results of these tests will be made available in accordance with the provisions of Clause 56.9.3 of the PSA.

6.4.2 Periodic Tests/Maintenance

Routine maintenance will be carried out by the Operator and the schedules used will be available for inspection in accordance with the provisions of the PSA.

6.5 Testing Procedures

A programme of any periodic tests shall be agreed between the

Registrant and the Operator. The intention to conduct particular tests, shall be notified to the Settlement System Administrator by the Operator in accordance with the provisions of the PSA.

6.6. Tests on New or Replacement Equipment

The opportunity will be given to witness comparable tests on any new or replacement equipment (which replaces existing equipment) in accordance with the provisions of Clause 56.9.2(a) of the PSA.

7. DATA TRANSMISSION ROUTES AND PROCESSING

(Diagram 1 represents the scheme in block form.)

7.1 Meter(s) to site Outstations

Data from Meters will be fed continuously and either directly or, where necessary, via a Meter interface unit, to the respective site Outstation.

Logic calculations carried out on the data by the Outstations may include:-

- (i) Summation of two or more inputs.
- (ii) Subtraction of one input or one summation from another input or Summation.
- (iii) Division of an input, a Summation, or an output, by an integer, generally 15 or less.
- (iv) Multiplication of an input, sometimes associated with a division to give a fraction.
- (v) Coding of the output, generally into 11 bit Teletype code, with even parity and parity checking.
- (vi) Counting in demand and/or cumulative logic.
- (vii) Scaling to convert each impulse to an appropriate count consistent with its impulse value.

Not all these forms will occur in any one equipment, and other forms may be required. Details shall be recorded in the relevant Agreed Procedures. The result of the Raw Data and Processed Data collected is stored in memory and remains stored on site after interrogation by the Collector Station, depending upon the capacity of the equipment for a minimum of 9 days after collection (generally a longer time period obtains), after which it will be overwritten. During this period, it can be retrieved.

7.2 Site Outstation to Collector Station

Data from Outstations will be collected by the respective

Collector Station by daily dial up. Further data transfers may take place; initiated manually automatic checking procedures are carried out on the data collected from Outstations and the results are reported at the Collector Station.

7.3 Collector Station to Central Station

Data from Collector Stations is transferred automatically each day. This data will normally relate to the previous day, but on occasion might cover two or more days in particular cases. If necessary, further data transfers may take place on any day, initiated manually, following investigation of reports.

The CEGB Specification "Communication Protocol Definition for the links between the IMS Projects and the Central Data Collection System" includes details of requirements for data transmission. The Central Data Collection System holds data collected, and these will be available to the relevant parties as provided for in Schedule 9 to the PSA. The data will be used by the Settlement System Administrator for the purposes of Settlement.

8. ACCESS TO DATA

8.1 General

Access to data and physical access to Metering Points, Data Collection Stations and the Central Data Collection System shall be in accordance with the provisions of the PSA and the Agreed Procedures.

8.2 Access to Metering Point

The Operator shall have physical access to the Metering System which he operates, which will include the ability at a Metering Point to interrogate the data collection outstation using a portable computer, known as an Interrogation Unit ("IU").

The IU can be used as a fault finding tool and, in exceptional circumstances when communications from the Collector Station fail for an extended period (BT line fault), can be used to retrieve the stored data.

Only staff both nominated by the Operator and authorised by the Settlement System Administrator may operate an IU and interrogation of a given Outstation requires use of a unique Outstation identification number.

9. MISSING OR DEFECTIVE DATA AND CONTINGENCY ARRANGEMENTS

Reference should be made to the Agreed Procedures (which are listed Schedule 16 to the PSA) and which cover the following operational considerations of the Data Collection Systems:-

- Sources of missing or defective data

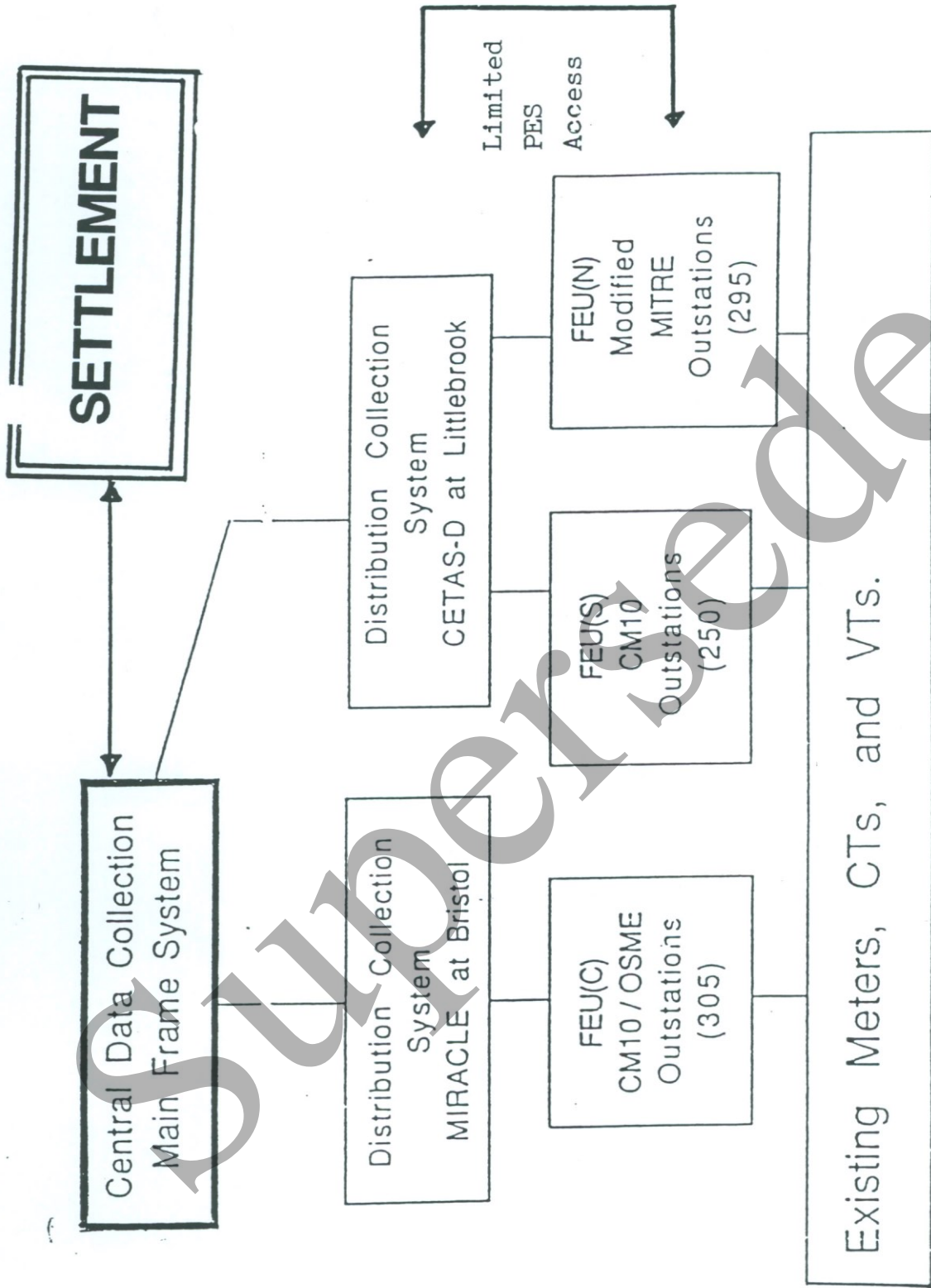
- Detection of defects
- Defect Procedures
- Validation of Data
- Reconciliation of discrepancies
- Estimation Procedures

10. NOTIFYING/SETTLING OF DISPUTES

Reference should be made to the relevant clauses of the PSA, which shall govern the procedures for notifying and settling of disputes.

Superseded

SJXH0021.90T



Dia.1: Interim Metering Scheme

APPENDIX A**LABELLING OF METERS FOR IMPORT AND EXPORT**

A1 It is considered desirable to recommend a standard method of labelling Meters (or suitable labelling panels, etc.) and to establish the relationship between Import and Export Active Energy, and Import and Export Reactive Energy. Accordingly, Meters (or suitable labelling panels, etc.) should be labelled in accordance with the following provisions of this Appendix B.

A2 **ACTIVE ENERGY**

Active Energy is considered to be Imported when it flows from the NGC Transmission System to the Distribution System of the PES. The Meter(s) registering this Active Energy should be labelled "Import".

Active Energy is considered to be exported when it flows from the system of a PES into the NGC Transmission System. This will normally only occur where generators are connected directly to the system of the PES, or that system is used to interconnect two or more supply points. The Meter(s) registering this Active Energy should be labelled "Export".

A3 **REACTIVE ENERGY**

Within the context of this recommendation, the relationship between Active Energy and Reactive Energy can best be established by means of the power factor. The following table gives the relationship:-

<i>Flow of Active Energy</i>	<i>Power Factor</i>	<i>Flow of Reactive Energy</i>
Import	Lagging	Import
Import	Leading	Export
Import	Unity	Zero
Export	Lagging	Export
Export	Leading	Import
Export	Unity	Zero

Meters for registering Import Reactive Energy should be labelled "Import Reactive" and those for registering Export Reactive Energy should be labelled "Export Reactive".

NOTE: This convention is based on "Import" and Export" being from the viewpoint of the Registrant of the Metering System.

APPENDIX B**RECOMMENDATIONS FOR PERIODIC TESTING AND RECALIBRATION OF METERS****1. Testing of Calibration****1.1 Routine Tests**

1.1.1 A routine test of calibration will be carried out on all Meters registered with the Settlement Administrator at an interval not exceeding 5 years. Specific intervals relating to particular types of Meter are given in Table 3 in section 6.1.3 above.

1.1.2 Where the test of calibration finds that a Meter is within the required system of accuracy limits set out in section 4.2 above, but indicates that it will not be capable of remaining within these limits until the next test according to the interval stated above, then the interval of tests shall be reviewed.

1.1.3 Routine tests will be carried out on site either at the prevailing load or by injection into the measuring transformer secondary circuits.

1.2 Other Calibration Tests

A test of calibration will be carried out:-

- (a) when the Operator of the Meter believes that the Meter is not performing to its required accuracy; or
- (b) under the metering provisions of the PSA (Clause 56.9.2) where either the Settlement System Administrator or a third party believes that the Meter is not performing to its required accuracy; or
- (c) following a dispute as to the values recorded by a Meter as provided for in Clause 56.15.2 of the PSA.

For those tests where the method of Clause 56.15.2(a) of the PSA is used (injection into the measuring circuits), measurement of accuracy shall be carried out over the whole range of the Meter at the following test points:-

Watt-hour meters	-	5%, 10%, 20%, 50%, 100% and 125% of rated measuring current at unity power factor
	-	20%, 50%, 100% and 125% of rated measuring current at 0.5 power factor lagging and

Var-hour meters	-	10%, 20%, 50%, 100% and 125% of rated measuring current at zero power factor
	-	20%, 50%, 100% and 125% of rated measuring current at 0.866 power factor lagging and leading.

2. Recalibration (refurbishment) Periods

2.1 Electromechanical Meters

Meters shall be subject to recalibration at a maximum interval of 10 years. Such recalibration shall usually mean removal from site, refurbishment and recalibration in a test laboratory before further use. Where it has previously been the practice to re-calibrate on site, the Executive Committee shall agree to the continuation of such practice. It should be noted that specific intervals relating to particular types of Meter are given in Table 4 in section 6.1.3 above.

Superseded