



**METERING POPULATION SURVEY
IMPLEMENTATION**

USAID-Funded Economic Governance II Project



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1. INTRODUCTION

A Metering Survey is to be carried out on the entire metering population in Iraq to ascertain the condition of the existing metering systems and provide the information required to facilitate both the installation of replacement metering where necessary and assist in correcting any anomalies within the existing billing file data. It is intended to carry out a pilot survey initially to prove the methodology, manpower resource and training and the application stability and suitability. The survey is designed to be carried out on a billing District basis but Baghdad (District Number 00) contains approximately 1 million Customers and is already split conveniently into two areas from a Meter Reading and Billing perspective – Resafa and Karkh. This District will therefore be done in two discreet sections to match the Meter Reading activity.

The data will be collected utilizing Personal Digital Assistants (PDAs), which are handheld devices, and a purpose built SQL database as the survey data repository. Prior to carrying out the pilot survey, the SQL database will be populated with data extracted from the Baghdad billing files. This data will simplify and speed up the survey data collection process and provide a benchmark to enable subsequent checking of the billing file accuracy.

The survey will be rolled out to the remainder of Iraq on satisfactory completion of the pilot and will be carried out on a billing District basis. After completion of the pilot, and subsequent Districts, the PDAs will be stripped of the current District data, populated with the next billing District to be surveyed, and be reused in this manner until the entire survey of Iraq is complete.

1.1. Purpose & Scope

The purpose of this deliverable is to detail the implementation of a solution for the Electricity Metering Survey. The detailed metering information gathered during the survey will serve to:

- Identify missing, damaged and faulty meters for priority replacement
- Facilitate improvement in site safety, reducing potential fraud and increasing revenue collection
- Provide the MoE with a comprehensive baseline database of meters, including age and condition, to:
 - enable the preparation of a long term meter replacement plan
 - provide data for a future Metering Asset Management System (MAMS)
- Provide an independent check on metering details and meter readings for billing file integrity purposes

1.2. Audience

The audience is the Ministry of Electricity Capacity Building Steering Committee, the Metering Subcommittee and USAID.

2. SURVEY METHODOLOGY

There are currently approximately 150 meter readers in Resafa who visit each residential customer every two months and every industrial customer every month. The original intention was to use 150 existing MoE staff to accompany the meter readers on their periodic meter reading visits to collect the survey data within a two month period. It has not been possible to provide this number of surveyors from existing resources within Resafa. The number has had to be reduced to 50 for the Resafa area of the pilot survey. (While sufficient numbers of staff are available in the Metering Maintenance Department, many of these are women and the Ministry felt that it would not be safe for them to carry out the survey). The 50 staff will be temporarily reassigned from their normal duties during the period of the survey.

The reduction in surveyors to one third of the original number planned will necessitate that the survey be extended to spread over three meter reading cycles and therefore will take approximately 6 months to complete. However there are resources available in the second half of Baghdad (Karkh), which was originally planned to be the second area surveyed, and the MoE is seeking additional staff from the Karkh area in order that the pilot may be extended to cover the whole of Baghdad within the same 6 month period. Provided the Karkh resource can be identified, trained and redeployed in line with the attached work plan as shown in Section 6 below, the completion of the survey for the whole of Baghdad will remain within the original planned timescale.

To reduce the manual data input process to a minimum, the data will be collected using a PDA. The PDA will be populated with Customer information data from the existing Billing files. This existing billing data and all subsequent data collected from site during the survey will be loaded into a SQL database application. The survey data will fill the gaps in any missing metering data and identify any inaccurate data in the billing file Customer information. The necessary billing information corrections will be made available to the Billing Department to allow them to update the billing files. The database application will also be utilized for analysis of the metering system conditions and to drive the production of Management reports to assist the MoE in their efforts to rectify any existing safety issues and metering problems and replace damaged and faulty meters in a structured manner.



3. PDA

Although the Host database will be used to accommodate all 3 million Customer records in Iraq, the PDAs will only be required to hold 1 billing District at any one time. The only exception to this is Baghdad itself (District 00) which will be split into Resafa and Karkh and loaded onto two separate sets of PDAs.

Although both Resafa and Karkh are Billing District 00, the Karkh data will be given District number 01 in the SQL application and the PDA so that the database can differentiate between the two survey areas when loading the PDAs. District number 01 is not used elsewhere in Iraq.

The billing Districts across the whole of Iraq are shown in Appendix B. Each District will be loaded into the PDAs as and when the individual districts are programmed for survey.

The PDA chosen for this purpose is a Dell Axim X50 with additional 512M memory card which will run a bespoke application designed and built by BearingPoint to facilitate the collection of the necessary survey data. A second 512M memory card will be supplied with each PDA to enable weekly rotation of the cards and, hence, continuation of the survey during the updating of the SQL database. The specification of this device is:

Processor:	320 MHz Intel XScale PXA270 with WMMX
Operating System:	Windows Mobile 2003 Second Edition
Display:	3.5 inch 240 x 320 QVGA screen
Memory:	64 MB SDRAM; 128 MB flash ROM; 2*512 RAM CF CARD
Size & Weight:	4.68" x 2.87" x 0.63", 167 grams (5.9 ounces)
Expansion:	CompactFlash Type 2 and SDIO slots
Docking:	36-pin connector, standard USB cradle
Communication:	Integrated Bluetooth 1.2
Audio:	Internal monaural speaker; microphone; 3.5mm headphone/headset jack
Battery:	Standard 3.7 volt, 1100 milliamp-hour Lithium-Ion battery
Input:	6 remappable application buttons; 5-way directional pad; touch screen
Software:	Metering Survey application, 802.1x security client
Other:	Consumer IR, lock switch

The PDA comes preloaded with applications such as email, contacts, Word and Excel. To reduce the temptation for misappropriation, all applications not required to enable the survey functionality will be removed, if possible, from the PDA so that it will only run the survey application.

The current billing information for Resafa is divided into two tables, one for Residential and one for Industrial. Karkh is similarly split into separate tables for Residential and Industrial. Each set of PDAs will be loaded with a full download of all the relevant fields from the District billing data which currently amounts to 477,134 Residential and 8,636 Industrial customers for the Resafa PDAs and 370,441 Residential Customers and 8,458 Industrial for the Karkh PDAs. These numbers will vary due to the ever changing situation of the billing files and addition of new customers/removal of redundant customers from the billing systems but are current as at the end of August 2005.

There are incidences of Customer account numbers in the Residential file which are duplicated in the Industrial file for both areas and, indeed, some duplication between Resafa and Karkh. This difficulty of lack of uniqueness will be overcome by adding an additional field to each data set to identify the

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customer type as Residential or Industrial. The primary key for locating the correct record will then be the existing Account Number plus the new customer type identifier.

The Baghdad billing data originally made available by the MoE for loading into the Host database application and PDAs had no Customer name and address information. This information was deliberately omitted for security reasons. However, the Ministry has requested that the address be editable and this field has now been included with the latest extract from the Billing files. The Customer names have still been omitted.

After completion of 1 week's survey, the surveyors will return their PDAs to the Distribution office and the memory cards will be removed and replaced by a second memory card so that the survey can continue. The PDA memory cards that have been removed will then be returned to the BearingPoint office so that the data collected during the preceding week can be uploaded to the Host database. On each occasion that the memory cards are uploaded to the host database, they will be synchronized with the latest global information within the database.

The Host database will track all changes so that it will be possible to report on the completeness of the survey and on any locations that have not been surveyed. The total synchronization of each memory card will also ensure that supervisory staff will have all data collected during the survey on an ongoing basis and be able to carry out spot checks to verify the data collected for accuracy and completeness.

Once delivered to Baghdad, each PDA will require numerous activities including:

- Removal of unnecessary application
- Installation of the survey application
- Charging of all batteries
- Initializing the application database on each PDA
- Loading of all surveyor user names and creation of passwords
- Loading approximately half of the PDAs with the Resafa data (number dependant on actual number of surveyors used in Resafa)
- Loading matching number of additional 512M memory card with Resafa data
- Loading approximately half of the PDAs with the Karkh data (number dependant on actual number of surveyors used Karkh)
- Loading matching number of additional 512M memory card with Karkh data
- Testing all PDAs for successful application operation
- Testing all PDAs for successful synchronization with SQL server
- Testing all PDAs for successful memory card change
- Official transfer of ownership and responsibility of PDAs to MoE

4. HOST DATABASE

The host database will eventually be populated with approximately 3 million records covering the whole of Iraq. To accommodate this number, the Database will be a SQL Server 2000 database. During the period of the survey, this will run on a PC in the BearingPoint offices within the Green Zone in Baghdad. Whilst the Database is hosted within BearingPoint's offices, day to day management of the database and the synchronizing of PDAs will be carried out by BearingPoint staff. On completion of the survey, at a suitably agreed time, the database will be transferred to the MoE at a location of their choice and control and management of the database and PDAs will pass to the MoE.

Operation and management of the Host Database and the SQL server will be the subject of separate documentation.

The specification for the PC to host the database is:

HP DX 2000
Mini-Tower
Intel Pentium 4, 3.2 GHz with 533 MHz FSB
512 MB SDRAM
One (1) 40GB EIDE Ultra ATA HDD at 7200 rpm
17" TFT flat panel display
Keyboard in Arabic
PS/2 2-button scroll mouse
10/100/1000 Network Interface Card
48 x CDROM
MS Windows XP Professional
MS Office XP Professional, Arabic Edition
Norton Antivirus

The data, as collected on each PDA, will be transferred to the host database by utilizing exchangeable media (512M memory cards) as described previously.

The Host database will be used to control and report on the survey progress and completeness. Reports will be produced on a regular basis as detailed in section 8 below.



5. DATA COLLECTION

The survey data will be collected utilizing a PDA which will be pre-populated with the necessary customer and metering information to reduce the manual input required at each site. The surveyors will only need to enter the fields highlighted in yellow but other fields, highlighted in blue, will be editable at the request of the MoE. The information in the PDA will consist of the following:

	Data Element Name	Size	Customer Details	
1	Service Account Number	11 (N)	Extract from billing file	
2	District	2 (C)	Created from billing file (1st & 2nd digits extracted from account number) *	
3	Ledger	3 (C)	Created from billing file (Residential -3rd, , 4th & 5th digits extracted from account number), (Industrial – 3rd & 4th digits from account number) *	
4	Meter Reading Sequence Number	6 (N)	Extract from billing file	
5	Customer Name	40 (A)	THIS FIELD WILL NOT NOW BE POPULATED	
6	Customer House Number	14 (A/N)	Extract from billing file	
7	Customer Street Address	40 (A/N)	Extract from billing file (Update if incorrect)	
8	Customer Class	3 (N)	Extract from billing file (Update if incorrect)	
			Meter Details	
9	Meter Manufacturer	1 (A)	Choose from drop down options. See table 1	
10	Meter Manufactured (Year)	4 (N)	Enter year of manufacture from meter faceplate	
11	Meter Type	3 (A/N)	Choose from drop down options. See table 2	
12	Meter Installation Date - if known	8 (N)	From billing file (Leave blank if not populated)	
			From Billing File	Update if incorrect
13	1 or 3 phases	1 (N)	Billing Extract	1 or 3
14	Meter Serial Number	9 (A/N)	Billing Extract	Site meter serial number
15	Multiplying Factor	6 (N)	Billing Extract	Site multiplying factor
16	CT Ratio	2 (N)	Enter CT Ratio. See table 3	
17	VT Ratio	1 (N)	Enter VT Ratio. See table 4	
18	Meter Reading	7 (N)	Enter actual meter reading (up to 7 digits)	
19	Reading Date	8 (N)	Populated with current date from PDA	
20	Meter condition	1 (A)	Choose from drop down options. See table 5	
21	Freeform Comment	40 (A)	40 Characters available	
	Repeat screens of “Meter Details” (Items 9 to 21) for each meter at site.			
*	To enable extraction of District and Ledger from account number, account number must be assumed to be a full 11 digits in total with all leading digits being 0 (zero).			



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Items 9 to 21 will be completed for each meter at every location. Residential customers will have only one meter but Industrial Customers may have up to 5 meters. The incidence of sites in Resafa with 5 meters (2) or 4 meters (5) is very low but there are 686 with 3 meters and 5,380 with 2 meters. In Karkh the numbers are 5 meters (1), 4 meters (10), 3 meters (457) and 2 meters (3,366). These numbers are current as at the end of August 2005 but will vary slightly over time due to the fact mentioned above regarding the additions and deletions made to the Billing Master files over recent and future months.

Each PDA will be loaded with all the necessary account information for the District being surveyed as detailed above so that any surveyor will be able to accompany any meter reader and have access to every customer during the daily survey process. The use of existing billing system data and drop down menus will minimize the complexity and the time taken to complete the survey.

The 5 tables referred to in the PDA representation above are detailed in Appendix A and show the various fields offered to the surveyor to simplify the input and reduce keying errors.

In addition to the items above, the most recent meter readings and reading date available for each meter will be uploaded to the SQL database and PDA so the surveyors will have sight of the last reading for each meter for comparison purposes. Unfortunately, due to obvious recent billing difficulties, readings are not available for the majority of sites as detailed below. However, on completion of the survey of each District, readings will be available for all sites visited. The only missing readings then will be from sites that are not accessible for security reasons.

Number of Meters at Industrial sites	Sites	Readings available for Resafa	Sites	Readings available for Karkh
5	2	0	1	0
4	5	0	10	1
3	686	81	457	19
2	5380	631	3366	146
1	8570	955	8397	416
0	66	0	61	0
Total sites	8636		8458	

Residential	Total Sites	Number of Sites with 1 Meter	Number of Sites with 0 Meters	Readings available
Resafa	477134	477113	21	147997
Karkh	370441	370419	22	86692

Those sites with no meter recorded at site will obviously be the subject of checking during the survey.

6. WORK PLAN

The Host database and PDA Application have been developed by BearingPoint and delivered to the BearingPoint office in Baghdad. Final testing and modifications to the PDA application such as translating the user interface to Arabic and bug fixes will be carried out in Baghdad. The PDAs have been requisitioned and are due to be delivered to BearingPoint office by early September 2005.

Below is a general overview of the tasks to be performed both by the MoE and BearingPoint leading up to the commencement of the survey:

Ministry of Electricity		BearingPoint	
Activity	Current Situation	Activity	Current Situation
Translate PDA screens	Done	Enter translations into PDA	Ongoing
Recruit surveyors for Resafa	Done	Debug PDA application	Ongoing
Recruit surveyors for Karkh	Ongoing	Set up 150 PDAs with application	Pending
Select staff for audit checking	Awaited		
Provide Baghdad current data	Done	Fix Baghdad data	Done
Train surveyors in metering	Ongoing	Load Baghdad data into SQL database	Done
		Test SQL database	Ongoing
Provide 150 User names	Awaited	Enter 150 user names and create passwords	Pending
		Train trainers in PDA	Pending
Cascade training in PDA	Pending	Issue PDAs to MoE	Pending
Provide location for surveyors office	Awaited	Arrange weekly transport for memory cards	Pending
Create routine for memory card transfer	Pending	Establish synchronization routine	Pending
Provide data for remainder of Iraq	Awaited	Fix remainder of Iraq data	Pending
		Load remainder of Iraq data into SQL database	Pending
		Test SQL database	Pending

The following detailed Electricity Workplan shows all the proposed activities and timescales for the pilot survey and eventual roll out to the whole of Iraq but is highly dependant on successful testing and implementation of the database and PDA application and deliverables from the MoE.



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Activities	Tasks	Sub-Tasks	Responsible	Completion	2006											
					Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Meter Population Survey																
<i>Pilot survey - Rusaffa</i>																
		PDAs: Delivery to Baghdad	BearingPoint	W1 Sep 05												
		PDAs: Upload application, billing data	BearingPoint	W2 Sep 05												
		Application: Translate screens	BearingPoint	W2 Sep 05												
		Application: test Arabic version	MoE	W3 Sep 05												
		Application: Finalise in Arabic	BearingPoint	W3 Sep 05												
Done		Application: provide latest billing data	MoE	W4 Aug 05												
Done		Application: Revise data for uploading	BearingPoint	W1 Sep 05												
		Application: Upload data	BearingPoint	W2 Sep 05												
Done		Enumerators: Final selection of individuals	MoE	W4 Aug 05												
		Enumerators: Training in survey techniques	MoE	W4 Sep 05												
		Enumerators: Training in the application	BearingPoint	W4 Sep 05												
		Survey Plan: Draft detailed Plan	BearingPoint	W2 Sep 05												
		Survey	BearingPoint	W4 Mar 06												
		Compile data	BearingPoint	W1 Apr 06												
		Update MoE billing files	MoE	W2 Apr 06												
		Draft Priority Metering Action Plan	BearingPoint	W4 Apr 06												
		Comments received	MoE	W1 May 06												
		Finalise report	BearingPoint	W2 May 06												
<i>Pilot survey - Karkh</i>																
		PDAs: Upload application, billing data	BearingPoint	W3 Sep 05												
Done		Application: provide latest billing data	MoE	W1 Sep 05												
Done		Application: Revise data for uploading	BearingPoint	W3 Sep 05												
		Application: Upload data	BearingPoint	W3 Sep 05												
		Enumerators: Final selection of individuals	MoE	W2 Sep 05												
		Enumerators: Training in survey techniques	MoE	W2 Oct 05												
		Enumerators: Training in the application	BearingPoint	W4 Sep 05												
		Survey Plan: Draft detailed Plan	BearingPoint	W2 Sep 05												
		Survey	BearingPoint	W4 Mar 06												
		Compile data	BearingPoint	W1 Apr 06												
		Update MoE billing files	MoE	W2 Apr 06												
		Draft Priority Metering Action Plan	BearingPoint	W4 Apr 06												
		Comments received	MoE	W1 May 06												
		Finalise report	BearingPoint	W2 May 06												
<i>Extend Survey to next districts</i>																
		Select next districts to be surveyed	MoE	W4 Nov 05												
		Target districts agree to survey	MoE	W2 Dec 05												
		Identify enumerators	MoE	W4 Dec 05												
		Obtain billing data	MoE	W4 Dec 05												
		Prepare billing data for uploading	BearingPoint	W4 Jan 06												
		Upload data to PDAs	BearingPoint	W1 Feb 06												
		Prepare Survey Plan	BearingPoint	W2 Feb 06												
		Train enumerators	MoE	W4 Feb 06												
		Survey	MoE	W1 Jul 06												

7. TRAINING

The Ministry, at their insistence, is to carry out the training of survey personnel in basic understanding of Metering and survey techniques, including recognition of meter types, meter faults, equipment interference and potential tampering. BearingPoint will provide training in the use of the PDAs and the survey application. This PDA training will be given to a selected group of trainers who will then train the whole group of surveyors.

The surveyors will require training dependent on their existing skill levels but will require knowledge of:

- Metering data recognition:
 - Meter manufacturer – the meters currently in use in Iraq are detailed in Table 1, Appendix A
 - Meter type – The meter types currently in use in Iraq are detailed in Table 2, Appendix A
 - Year of manufacture – this will be found on the meter face plate/s at each site
 - Meter Serial Number – this will be found on the meter face plate/ at each site
 - Multiplying factor – this will be extracted from the billing files and can be verified at site
 - Meter Reading – Basic requirement to transfer meter reading to PDA
 - Meter condition – based on the table 5 of options in Appendix A

- PDA Operation

This training will be the subject of separate documentation entitled “PDA Training Requirements DDMMYY” which will include:

- Windows operating system – basic knowledge of Windows
 - PDA Operation – functionality and operation of the PDA
 - Logging in to the survey system – user name and password
 - Manual data entry – modifying addresses, house numbers etc.
 - Drop down box choices – use and meaning of tables in Appendix A
 - Memory card changing – weekly replacement of 512M memory card
 - Battery recharging – regular requirement to recharge battery
 - Freeform entry – ad hoc comments not catered for in PDA forms and drop down tables
- Host database Application and PDA
- Subsequent to adoption of the Host Application, office and IT staff will require knowledge of:
- Windows operating system – basic knowledge of Windows
 - New SQL database Application – basic knowledge of SQL database management

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- Microsoft Access – database administration
- PDA synchronization with Application – Uploading data from PDA to SQL and vice versa, initializing database and loading a new District to the PDA
- Accuracy monitoring of survey data – audit trailing via site spot checks to monitor surveyor accuracy and completeness
- Freeform interpretation – freeform comments should be monitored for repeated use to update the Conditions table and reduce the frequency of use of this field
- Report production – production of Access reports utilizing an ODBC connection to the SQL server database.
- Correction of billing information – monitoring survey data, identifying billing file inaccuracies and reporting the errors for billing file correction

8. REPORTING

The underlying purpose of the survey is twofold:–

- To acquire full and accurate information about the operational state of the current metering installations to enable repairs and replacements to be carried out in a structured manner.
- To compare current billing information with the actual customer premise information to enable updating and correction of any billing file inaccuracies.

In order that the information collected may best be utilized to fulfill the above requirements, there will be appropriate management reports produced from the Host Database which, inter alia, will consist of:

- Regular billing discrepancy report

At a period to be agreed with the MoE billing system manager, all occurrences of billing file anomalies will be reported to enable the billing files to be corrected.

- Periodic Metering Issues reports

The survey is to take approximately 6 months to complete for the pilot phase and a substantial period for the whole country depending on the manpower resource made available.

The metering issue reports will be of varied content dependant on the nature and extent of the problems identified in the early analysis of the survey data. The reports will be designed using an Access attachment via ODBC to the SQL database. This simple methodology has been chosen to enable the MoE staff to design their own reports once the application has been transferred into the control of the Ministry staff. Pending this transfer the reports will be produced by BearingPoint and cover areas such as:

- Dangerous situations – Safety concerns will require immediate visits to rectify the situation
- Damaged/Missing metering – Meter to be replaced as soon as practicable
- Loss of Revenue/Potential fraud – Investigative visit and subsequent action

In order that the benefits of the survey can be instituted in the short term, the metering issues reports will be created on an ongoing basis rather than at the end of the survey after full analysis. Initial and hence, incomplete, survey results will not provide sufficient data for analysis to ascertain the precise numbers and types of meters to be ordered to replace the total faulty or damaged population. However, early results will provide indicative numbers to be used as a guide to the likely overall level of meters required and permit early procurement as necessary. This guide can be periodically refined as more results are gathered.

Once the collection process has been underway for 2 to 3 weeks and data has been collected from approximately 25,000 sites, it will be possible to issue meaningful reports to the Ministry Metering Department. These reports will be generated in Access. This methodology has been instituted to simplify future use by MoE staff and avoid the necessity of a specialist in SQL to generate further reports. Using Access, it is a straight forward exercise to produce reports on an ad hoc basis when the MoE adopts the application.

Since the survey is to be carried out in tandem with the normal Meter Reading visits, the results will match closely to the Ledgers within each District. The reports will therefore be issued based on the



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“Ledger” field and this can be initiated on a weekly basis or on completion of the entire Ledger at the discretion of the MoE. The contents of the Residential Ledgers vary widely from 9 customers (Ledger 741) to 10,853 customers (Ledger 765). The Industrial Ledgers vary in customer numbers from 4 to 2,051. It would therefore be appropriate to issue the reports at weekly intervals for those Ledgers that will take more than 2 weeks to complete.

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Appendix A – Drop down tables from the PDA input screens

Table 1 Meter manufacturer

Table 1 contains the option choices for Meter Manufacturer based on the meters in current use in Iraq. Apart from the “Other” choice, this table will remain in English since the Meter Manufacturers’ names on the Meters are in English. The surveyor will click the box and choose the correct Meter Manufacturer from these choices. If the Meter at site is not available in the option box, the surveyor will mark the Manufacturer as “L” – Other and then enter the new Manufacturer’s name in the Comments box. Assurance has been received from the MoE that the table is a complete list of Manufacturers currently used and there should be no requirement to use the “Other” category. When new Meters are installed, any new Meter Manufacturers can be added to the database and the PDA application for future use.

Code	Manufacturer - Item 9
A	AEG
B	Diyala
C	Ferranti
D	Ganz
E	Grizik
F	Hindi
G	Holly
H	Landis & Gyr
J	Sewedy
K	Siemens
L	Other (Specify in Comments Item 21)



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Table 2 – Meter Type

Table 2 contains the option choices for Meter Type based on the meters in current use in Iraq. Apart from the “Other” choice, this table will remain in English since the Meter Type on the Meter is in English. The surveyor will click the box and choose the correct Meter Type from these choices. If the Meter Type at site is not available in the option box, the surveyor will mark the Type as “L” – Other and then enter the new Manufacturer’s type in the Comments box. Assurance has been received from the MoE that only one Meter type is in operation for each Meter Manufacturer used and there should be no requirement to use the “Other” category. When new Meters are installed, any new Meter Types can be added to the database and the PDA application for future use.

Code	Meter Type - Item 11
A01	AEG - DHICZC 19 WI
B01	Diyala - ML 230 XF3
C01	Ferranti - FNEA 34 Q
D01	Ganz - HNG 4
E01	Grizik - ET 414 K
F01	Hindi - EH-341
G01	Holly - DT 862
H01	Landis & Gyr - ML 3
J01	Sewedy
K01	Siemens - 7 CA 5461
L--	Other – specify in comments
<u>A</u>MD <u>B</u>MD etc.	Maximum Demand meters. * Use manufacturers letter plus MD

*

Some of the meters in use in Industrial locations are used for dual purposes i.e. normal energy measurement and Maximum Demand (MD). However the meter is considered to be two different meters in the billing information. In these instances the meter serial number in the billing file and in the PDA should be the same as the faceplate serial number for the energy meter (Meter Number 1). The serial number used in the billing file for the MD is the same serial number as Meter Number 1 but has the first digit/s removed.

For an explanation of the options for checking the MD Meter Serial Number see the following details and table of examples.

If the serial number of Meter Number 1 is 123456, then the serial number used for the MD meter would be 23456 – i.e. ignore the first digit (1). If the serial number of Meter Number 1 is 103456, the serial number used for the MD would be 03456 but the serial number should not start with a leading zero and therefore cannot be 03456. In this case, the zero would also be ignored and the MD meter serial number would be 3456. If the serial number of Meter Number 1 is 100456, ignoring the first digit (1) would give a serial number for the MD meter of 00456. In this case, the two leading zeros



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would also be ignored and the MD meter serial number would be 456. This would apply to any number of consecutive zeros following the first digit in Meter Number 1 serial number.

The table gives examples of the Meter Number 1 serial number and the equivalent serial number to be used for the MD Meter:

Meter Number 1 Serial Number	Digit/s removed	MD Meter Serial Number
123456	1	23456
37888	3	7888
206684	20	6684
400521	400	521
700027	7000	27

The surveyor will need to recognize that the serial number listed in the PDA for the MD part of the meter is a subset of the actual meter serial number on the meter face plate and choose the meter type from the list above as MD with manufacturers prefix for this PDA entry.

The MD meter serial number recorded in the PDA should only be corrected if the subset of Meter Number 1 serial number has been recorded in the Billing files (and hence the PDA) incorrectly. For example – if Meter Number 1 serial number is 123**456** then the MD meter serial number should be 23**456**. If, however, it has been recorded as 23**546**, then the PDA record should be amended to the correct serial number of 23**456**.



Table 3 – CT Ratios

The CT Ratio is the technical data pertaining to the Current Transformer used to drive the Metering and hence the billing calculation. This data is available at site but it will require a higher level of expertise than the metering surveyors to locate the correct current transformers and collect the data. For this reason, the CT Ratio will be collected at a later date by more experienced Metering personnel who will use the same PDAs to record the details.

The list of potential CT ratios covers all possible combinations and will be more than are required for the options in current use in Iraq. The extra values will be left in the database to cover any new ratios that are available and may be used in the future. Apart from the title “CT Ratio”, this table will not be translated since English numerals are acceptable.

The data collector will click the box and choose the correct CT Ratio from these choices.

Code	CT Ratio – Item 16
1	100/5
2	200/5
3	300/5
4	400/5
5	500/5
6	600/5
8	800/5
10	1000/5
12	1200/5
16	1600/5



Table 4 – VT Ratios

The VT Ratio is the technical data pertaining to the Voltage Transformer used to drive the Meter and hence the billing calculation. As with the CT, this data is available at site but will be collected later by the more experienced Metering personnel who will use the same PDAs.

The list of potential VT ratios covers all possible combinations and will be more than are required for the options in current use in Iraq. All the Industrial Customers to be surveyed initially are connected to the 11,000 volt Distribution System and therefore the only ratio required is 11000/110. The other values are included so that the survey can be extended to higher voltage levels using the same PDAs and database if the MoE requires. Apart from the title “VT Ratio”, this table will not be translated since English numerals are acceptable.

The data collector will click the box and choose the correct VT Ratio from these choices.

Code	VT Ratio – Item 17
1	6600/110
2	11000/110
3	33000/110
4	132000/110
5	400000/110

Table 5 – Meter Condition

Table 5 contains the option choices for Meter Condition. The database will need to allow multiple entries for these conditions (up to 3 different conditions for each meter) since several may exist at the same location. This table will be translated into Arabic for inclusion in the application. Meter Condition 1 is a required field and will be populated with OK so that the surveyor will not be required to change this field if there are no problems at site.

Code	Meter Condition - Item 20	Example
A	No Meter – No Supply	Building has no electricity supply or meter
B	No Meter – Supply in use	Customer is using electricity but it is not metered
C	Broken Meter Case	The meter case has been damaged
D	Broken Meter Glass	The meter glass is cracked or broken
E	Missing Main Cover Seals	Access is possible to the internal works of the meter
F	Missing Terminal Cover Seals	Access is possible to meter terminals
G	Single phase meter with 3 phase supply in use	All 3 phases are in use but only 1 phase is metered
H	Interference with Meter Case	Holes drilled in case to interfere with disk
J	Interference with wiring	Meter shorted out or wiring reversed
K	Other (Specify in Comments) (Item 21)	Any condition not detailed above
L	OK (Default)	There are no problems with the meter or the wiring

In order to collect information under items A and B, it will be necessary to visit every site regardless of whether the meter reader normally calls or not. This will ensure that any properties with no electricity or using unmetered electricity are identified for action.

Appendices

Appendix B – Billing District Numbers

Map #	Directorate	Billing District #	Map #	Directorate	Billing District #
1	Baghdad (بغداد)	00/01	10	Babil (بابل)	53
2	Salah ad Din (الدين صلاح)	32	11	Karbala (كربلاء)	55
3	Diyala (ديالى)	33	12	An Najaf (النجف)	54
4	Wasit (واسط)	34	13	Al Anbar (الأنبار)	52
5	Maysan (ميسان)	60	14	Ninawa (نينوى)	10
6	Al Basrah (البصرة)	59	15	Dahuk (دهوك)	63
7	Dhi Qar (ذي قار)	58	16	Arbil (أربيل)	65
8	Al Muthanna (المثنى)	57	17	At Ta'mim (التأميم)	64
9	Al Qadisyah (القادسية)	56	18	As Sulaymaniyah (السليمانية)	62

