

USAID / SOUTH ASIA REGIONAL INITIATIVE FOR ENERGY (SARI/ENERGY)

26th July to 8th August, 2010

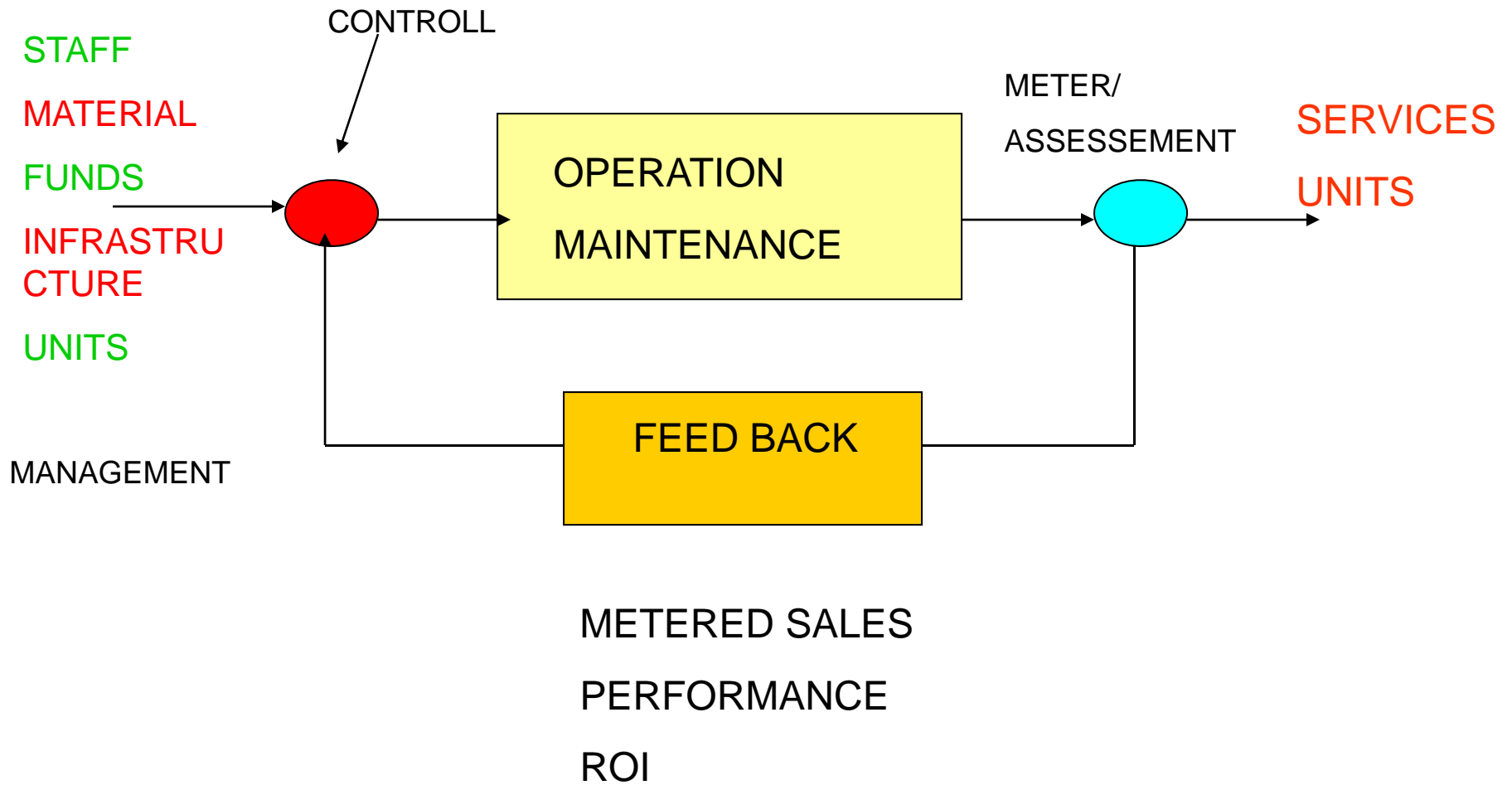
**Central Institute for Rural Electrification of
Rural Electrification Corporation Ltd
(A Govt. of India)**

Hyderabad, Andhra Pradesh, India

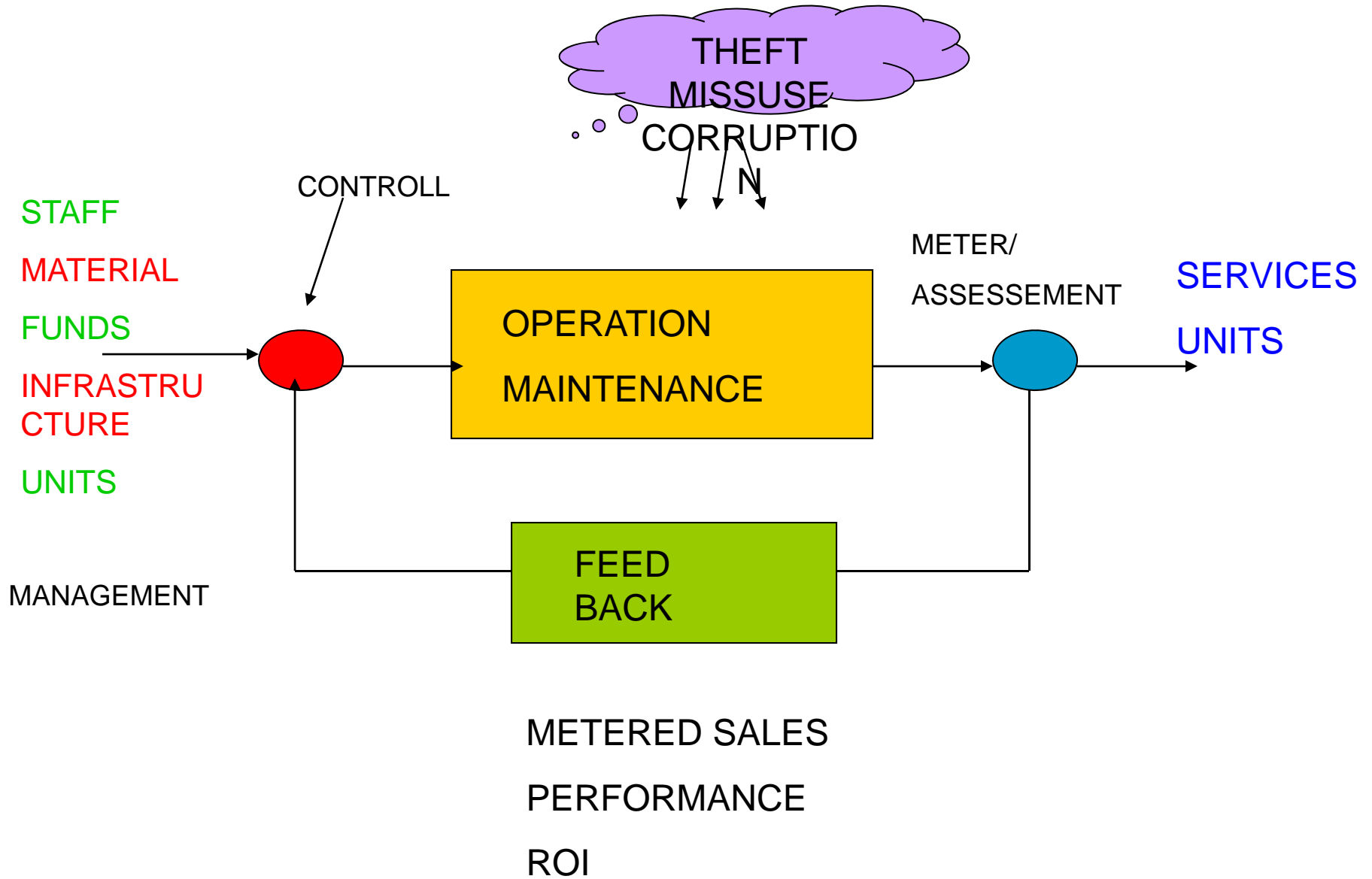
**CAPACITY BUILDING
PROGRAM ON
DISTRIBUTION SYSTEM LOSS
REDUCTION
FOR
AFGHANISTAN POWER
EXECUTIVES**

MONITORING & CONTROL OF COMMERCIAL LOSSES IN DISTRIBUTION SYSTEM

MANAGERIAL VIE OF ELECTRICAL UTILITY



MANAGERIAL VIEW OF ELECTRICAL UTILITY



DISTRIBUTION SYSTEM LOSSES.

❖ TECHNICAL .

❖ COMMERCIAL .

- **TECHNICAL LOSSES**

- Weak Sub transmission and Distribution system.
- Over Loading of Lines and Transformer.
- Inadequate Reactive Compensation at the Load Points.
- Poor Maintenance of Equipment.

- REASONS FOR COMMERCIAL LOSSES
 - Unmetered Supply to AG PUMPS.
 - Pilferage and Theft of Energy.
 - Difficiencies in Metering and Billing System.
 - Lack of Energy Accounting.

ACTION TO REDUCE TECHNICAL LOSSES

- Division of Loads by Splitting Heavily Loaded Feeder more than 100 Amps.
- Bifurcating of LT Circuits on Distribution Transformer.
- Implementation of HVDS.
- Augmentation of Power and Distribution Transformers.
- Replacement and Reconductoring of Old 33kV / 11kV / LT Lines.
- Installation of Shunt capacitors.

MEASURES FOR REDUCING COMMERCIAL LOSSES

- Tamper Proof Meter Boxes and Tamper Proof Seals
- Providing Electronic Meter.
- Use of Modern Technology such as Prepaid Meter, Remote Metering.
- Effective Energy Accounting and Energy Auditing.
- Enforcement of Vigilance and Legal.
- Regularisation of Unauthorised Connections.

MEASURES FOR REDUCING COMMERCIAL LOSSES

- Wilful Tampering.
- Bypassing of Meter.
- No Meter.
- Faulty Meter.
- Non-Reading of Meter.
- Inaccurate Meter Reading.
- Inefficient Billing.
- Decentralised Computer Billing.

THEFT OF ENERGY

- **VISIBLE THEFT**
- **INVISIBLE THEFT**
 - **Tampered / Counterfeit / Bogus seals**

VISIBLE THEFT

- Tapping the supply from the incoming service wires at the concealed portion
- Tapping supply from the overhead lines.
- By passing current coil in Meter Terminal Cover.
- Dropping potential links in meter terminal cover
- Switch control in phase
- Switch control through neutral .
- Shorting the current coil in the TTB .

INVISIBLE THEFT INSIDE THE METER

- **MECHANICAL METERS**
- Tightening the bearing
- Providing shunts across the current coils .
- Dropping potential links
- Dislocating the spindle from vertical position
- Reversing the reading
- Interchanging the connections of s1 and s2 inside
- Changing the current coils with the higher capacity .
- Disturbing the magnet from its original position
- Adjusting the PF screw .
- Filing the driving gear teeth .
- Reversing the phase and neutral .

THEFT OF ENERGY CASES (HT)

REMOTE CONTROL

- During the year 1992-1993 about 9 Steel Mills were and caught red handed while pilfering energy.
- The modus of operation is by tampering the meter board seals and introducing a 12 volts relay and sensor coil in voltage circuit of R,Y and B phases behind the meter board and operating at their will and pleasure through remote arrangement.
- Cases were booked with penalty of 23 crores.

ENERGY AUDIT- DETECTION OF THEFT

- 11 KV Feeder Loss 25 % at S.S.
- All the services checked thoroughly on this feeder .
- Only one service is a Major Consumer .
- Y- Phase PT tamper events recorded in short durations for 100 times.
- Provided check meter.
- Secondary wires found cut by cutting the secondary GI pipe before the meter box
- Pilferage case was booked for an amount of Rs 5 Crores

BACK-BILLING CASES (HT)

132 KV Service

- CMD: 8000 KVA
- B Phase voltage is low by 8 %.
- Improper contact at terminals of B phase PT Link
- Increase in consumption by 3 % after rectification.

DEFECTIVE CTPT

- UN BALANCE VOLTAGES
- R-n=6434, Y-n=5212, B-n=6212 volts
- CTPT replaced with New.
- Recording improved by 12%
- Back billing done for six months based on tamper events for an amount of 5.6 lacks

LT CASES CASE STUDY

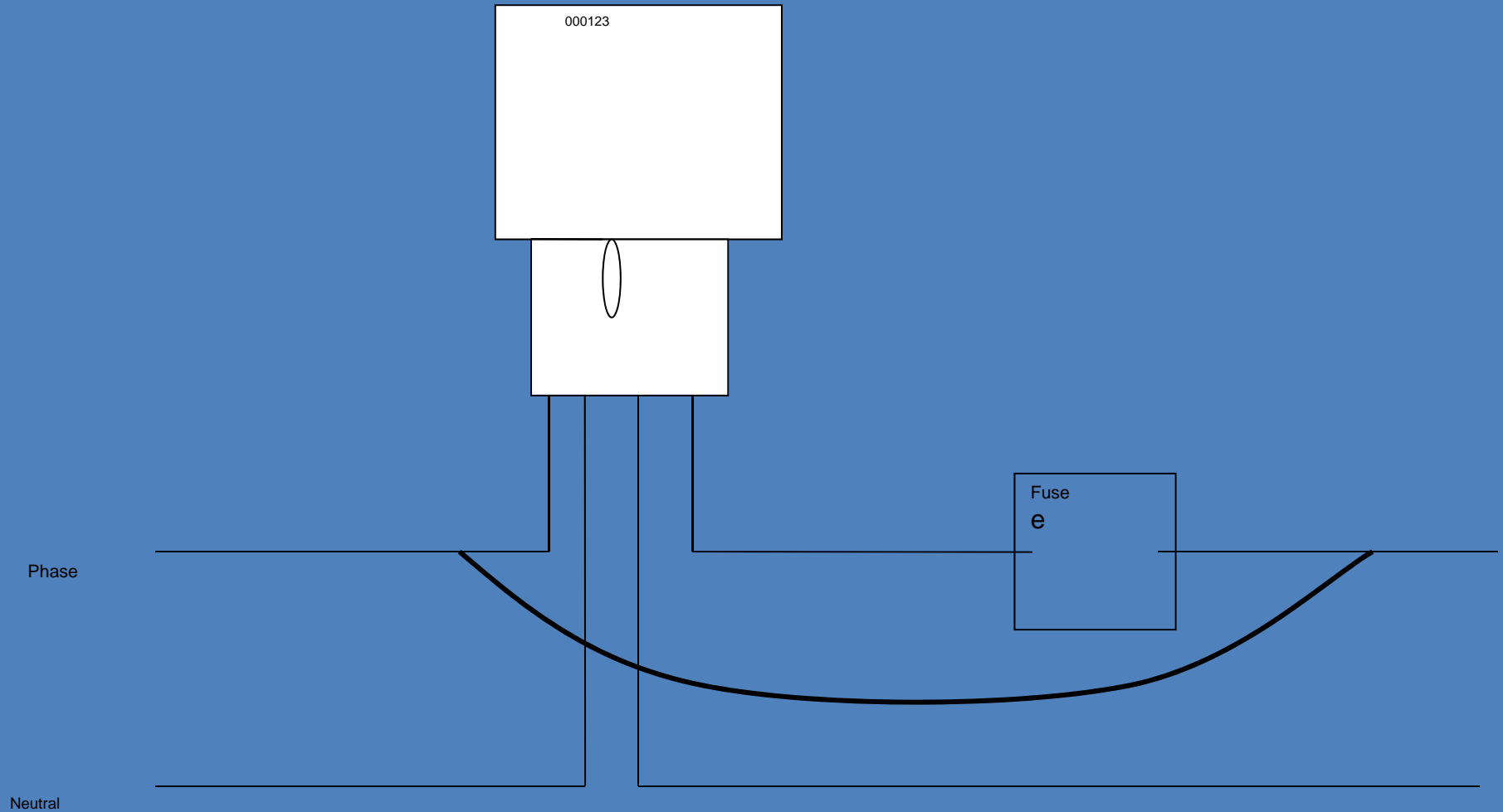
➤ THEFT CASES

➤ THEFT DETECTED IN ELECTRONIC METERS

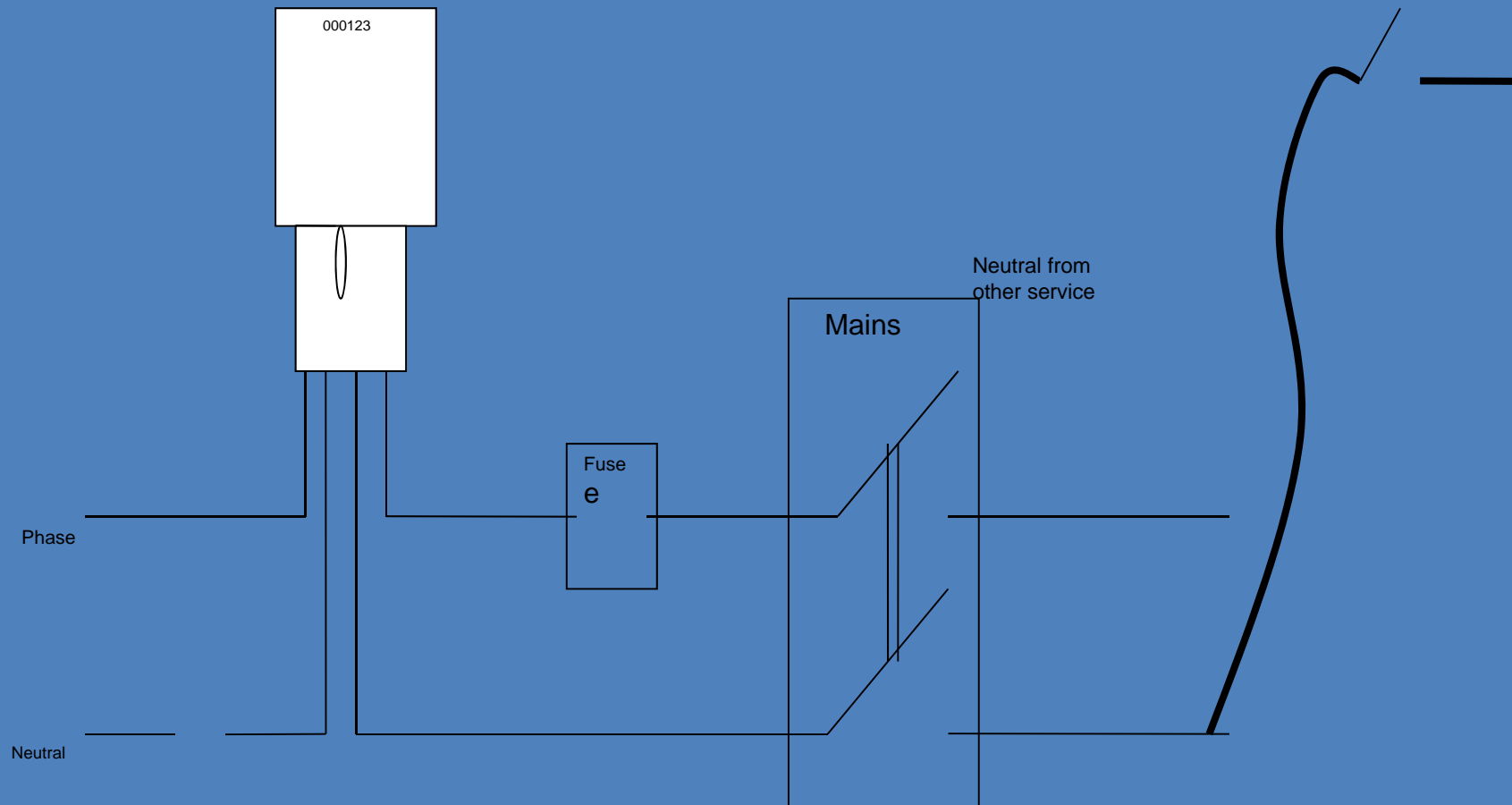
➤ **HOTEL** (BY PASS OF NEUTRAL)(Rs2.5 lacks)

➤ **HOUSE** (ADDING RESISTANCE IN THE INTERNAL CIRCUIT)

LT metered services



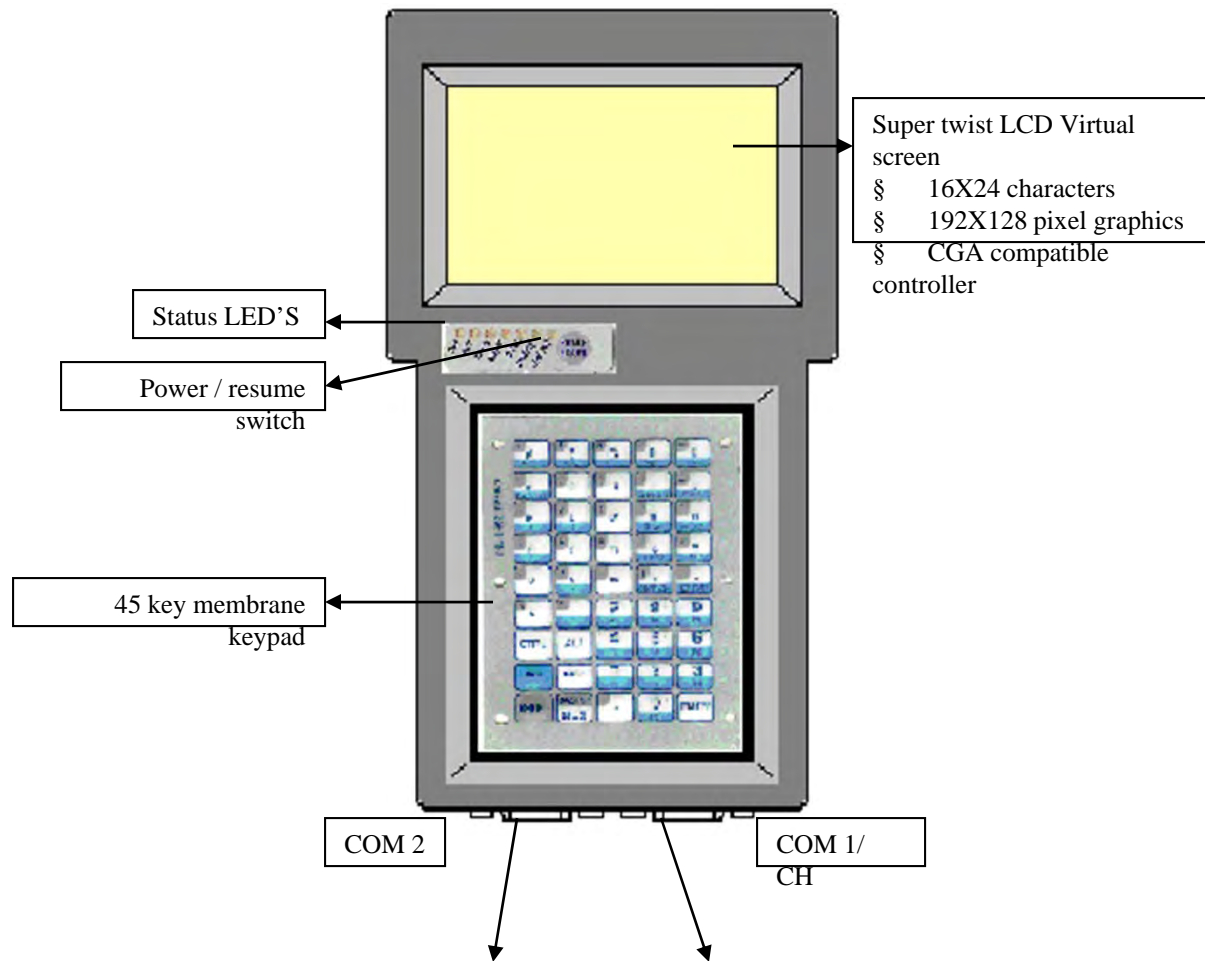
LT metered services



UN-AUTHORISED USAGE

- OFFICE OF C.A IN A COMPLEX BILLED UNDER CAT-1.
- OLD SERVICE IN A PRIVATE SCHOOL.
- EXTENSION FROM HOUSE TO SHOP.

COMMON METER READING INSTRUMENT



MRI Data Analysis

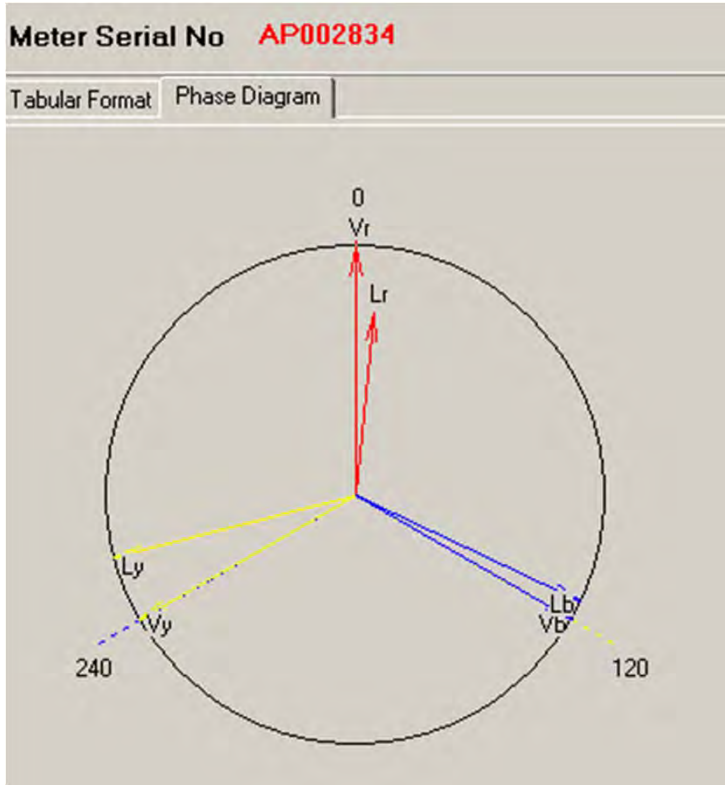
- Instant Parameters
- Tamper Events
- Load Survey Graphs
- Billing Data
- Transactions

Instant Parameters

Meter Serial No AP002834		Meter Type HT(3P-4W)			
Tabular Format		Phase Diagram			
Date / Time (as recorded by)					
Meter(while read) 29/01/2004 17:23:22		MRI(while read) 29/01/2004 17:24:46	PC (while Dump) 30/01/2004 13:46:00		
Frequency 49.415 Hz					
Voltage	6,235.000	6,267.000	6,254.000	V	
Line Current	2.210	3.038	3.009	A	
Active Current	2.200	2.929	2.999	A	
Reactive Current	0.219	0.806	-0.243	A	
Power Factor	0.995 Lg	0.964 Lg	0.997 Ld		
Active Power	50.828 kW	Apparent Power	51.063 kVA	Reactive Power	4.897 kVAr
Average Power Factor	0.995	Phase Sequence	Reverse		
Angles	240.13	119.93			
System CTR	10	Meter CTR	5	Meter/CTPT ratios	
System PTR	11000	Meter PTR	110		

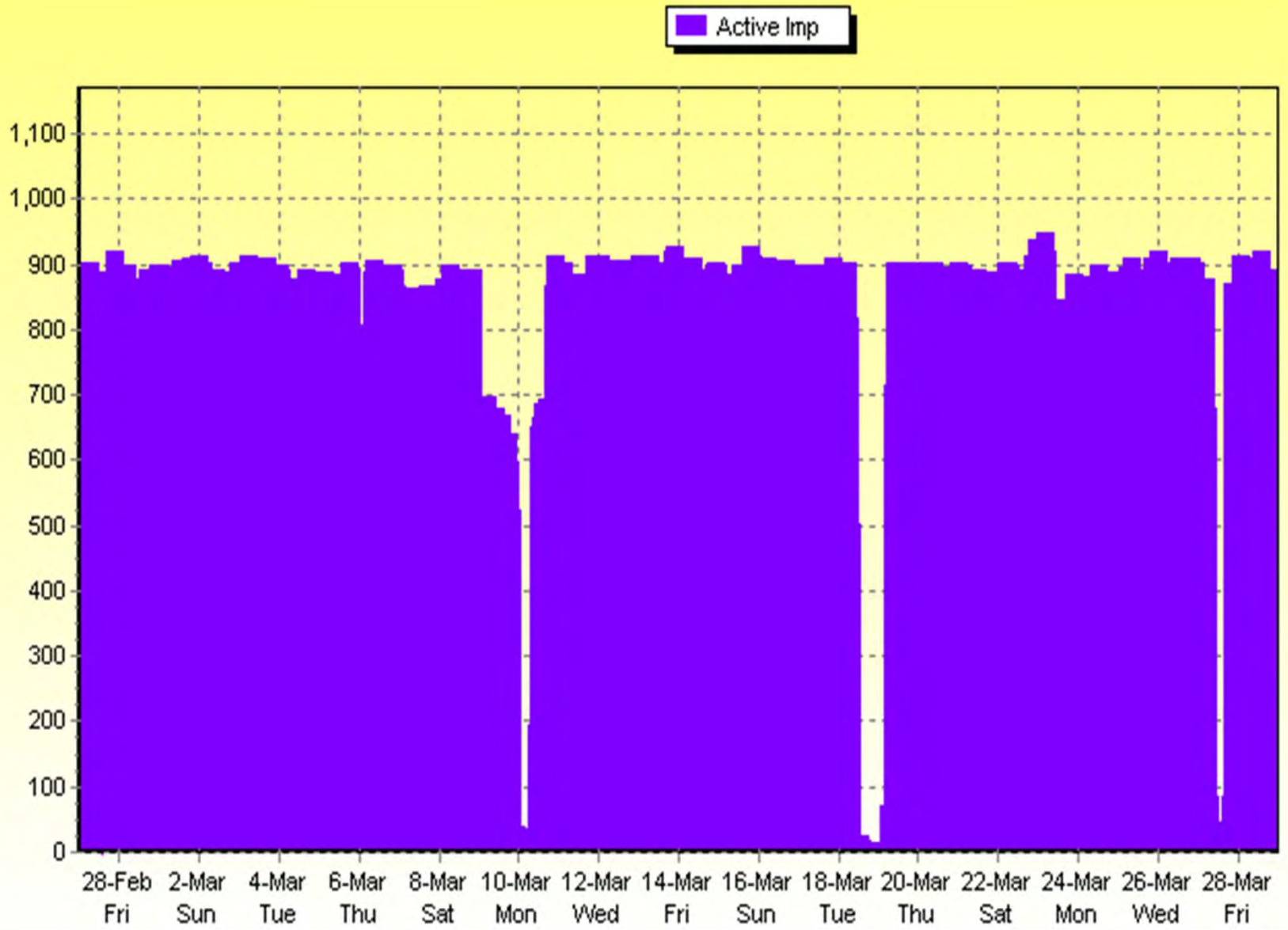
 Inst.
 Parameters


Vector Diagram



Month Load Graph

Kw





Meter Detail

Filename : C:\PROGRA~1\ENTITY\SMART2~1\DATA\PSION\HDND109A.MRD
 Serial No : AF001416 Meter Prog. : APP2G02 Located At :
 Meter Scaling: Secondary Tariff : APT0000 Old Tariff : DF10000
 Meter CT : 1 System CTR: 1 System PTR : 1
 Meter P.T. Rating : --- /100 V Meter PT : 1 BMF : 1
 Meter C.T. Rating : --- /5 Amp App. Cal. based On : LAG ONLY

Session Detail

Time of reading (MRI) : 31/08/2003 14:07:25 Time of reading (Meter) : 31/08/2003 14:33:46
 Meter Reading Count : 000004 Time of Data Dump on PC : 01/09/2003 12:15:00
 MD Reset Count : 000003
 Last MD reset Mechanism through : Push Button on 28/12/1999 18:45

Billing Date Details

History	Billing Date
1	28 December

Main Energy Registers

Energy	Billing Date	Wh(I)	Wh(E)	VARh(Ld)- Wh(I)	VARh(Lg)- Wh(I)	VARh(Lg)- Wh(E)	VARh(Ld)- Wh(E)	VAh(I)	VAh(E)
Current	-----	7699530.0	10.0	0.0	6336850.0	0.0	0.0	32060.0	10.0
History - 1	28 December	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

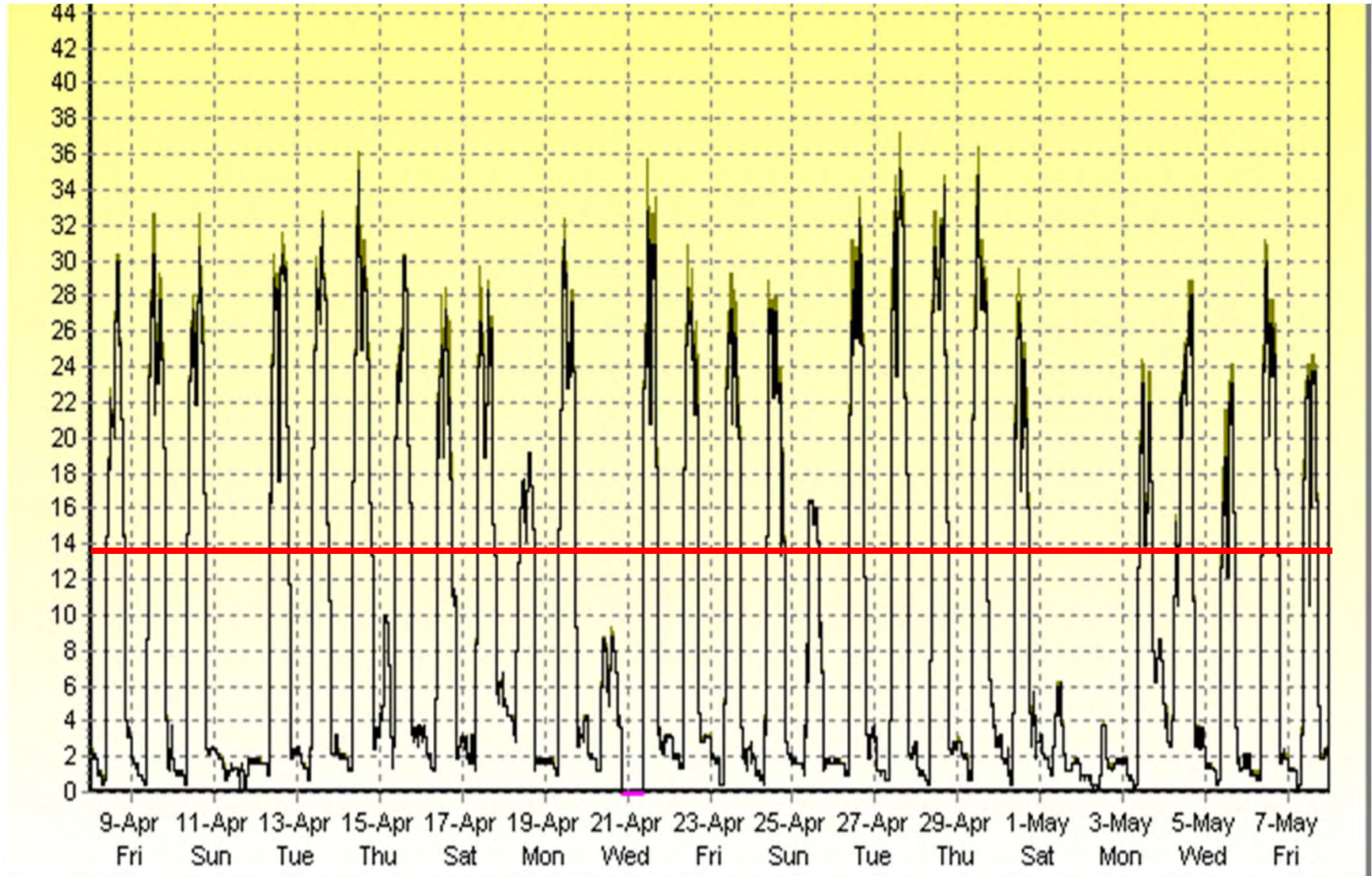
Main Energy Consumption

History	Wh(I)	Wh(E)	VARh(Ld)- Wh(I)	VARh(Lg)- Wh(I)	VARh(Lg)- Wh(E)	VARh(Ld)- Wh(E)	VAh(I)	VAh(E)
00-01	7699530.0	10.0	0.0	6336850.0	0.0	0.0	32060.0	10.0

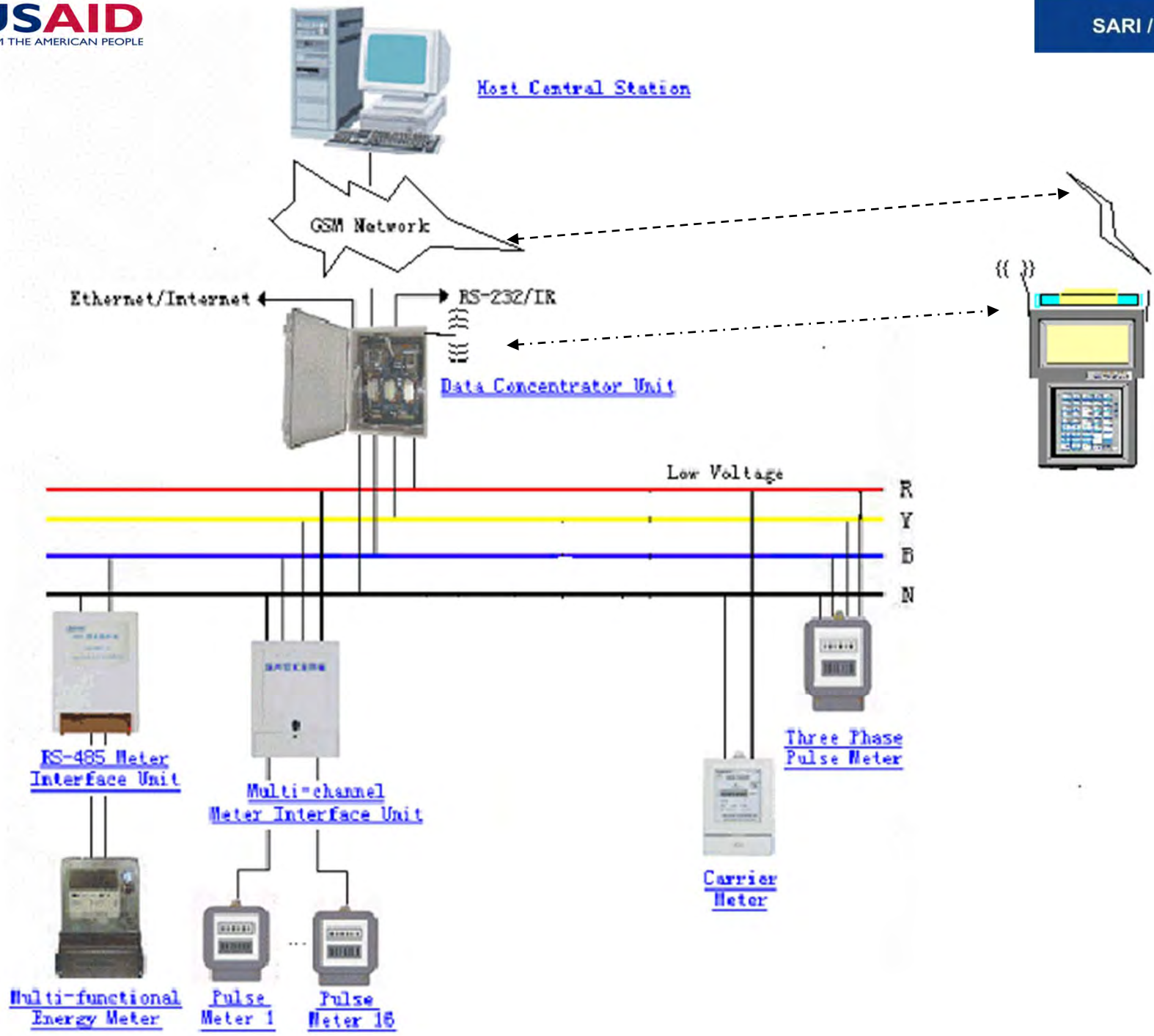
MD reset date details

MD Reset Date	Md reset MEch.
28 December	Push Button

Load pattern of XXX Industries , CMD : 75 KVA ,



A
M
R
B
C





SARI / Energy

THANK YOU