Equipment Asset Management for Municipalities

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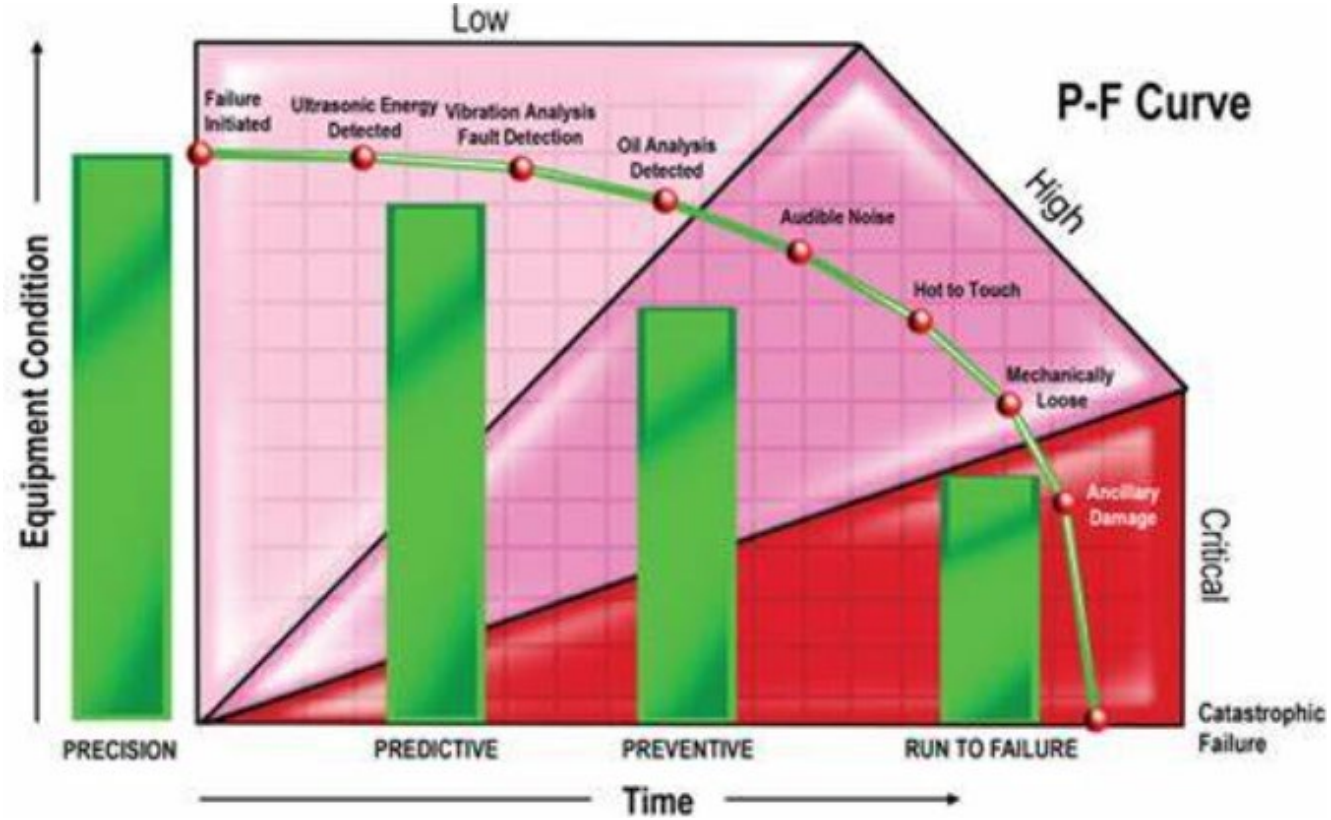
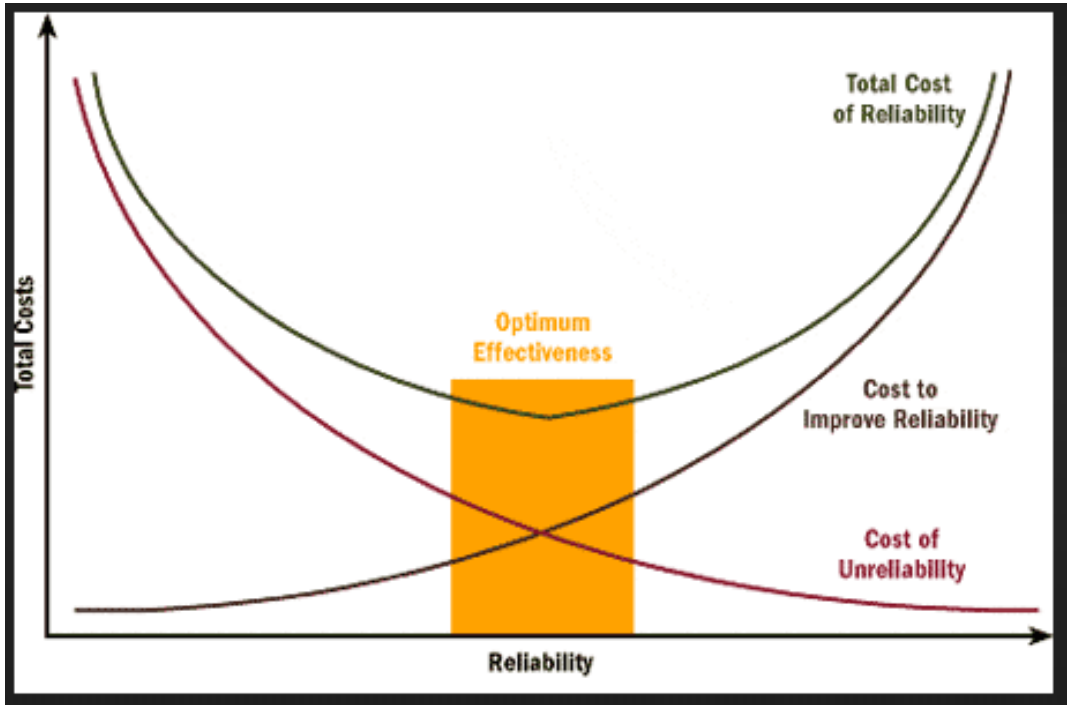
What is Asset Management?

- Optimize the quality and utilization of assets throughout their lifecycle, increase productive uptime and reduce operational costs.
- Optimizing quality and utilization throughout the lifecycle: Ensure the asset can perform the function it was intended to for the desired duration.
- Uptime: The amount of time that the asset is available to perform its desired function.
- Reduce operational costs: Perform the work before a major failure.
- Doing the right work at the right time.

Asset and Program Performance





Asset Management Program

- Identify
- Equipment Criticality Rankings
- Failure Modes and Effects Analysis
- Maintenance Plans

Identify

- Use existing information or perform an “inventory” of all equipment.
- GIS, One-line diagrams, equipment lists, etc.
- Nomenclature
- Physical location
- Photos
- Equipment records
- Complete and comprehensive

Equipment Criticality Ranking

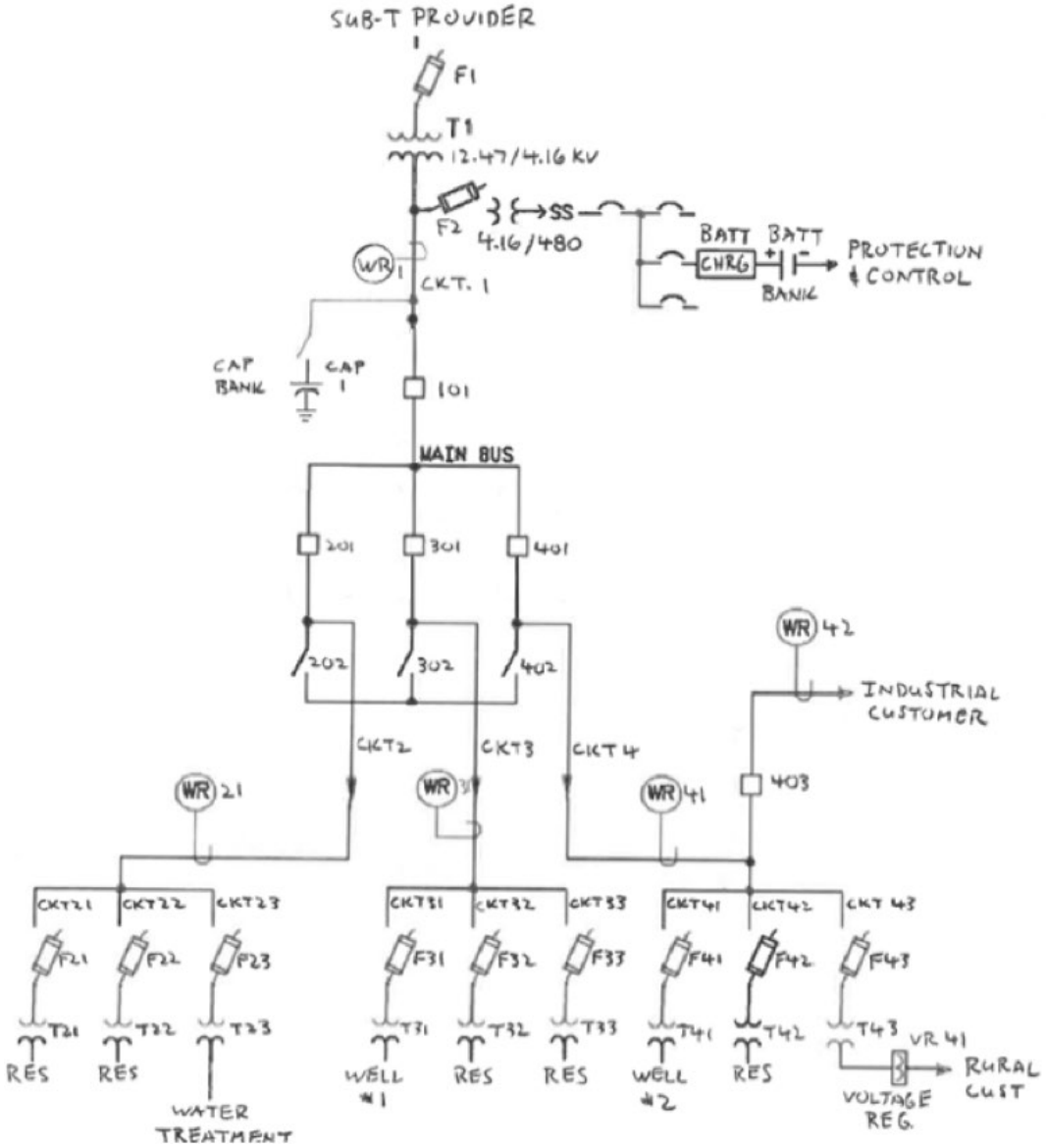
- Reliability
- Safety
- Compliance
- Cost
- Rank 1 - 4

Failure Modes and Effects Analysis

- How can the equipment fail?
- What effect does it have on the system?
- What steps can be taken to mitigate the failure?
- Use equipment history, OEM data, tribal knowledge.

Maintenance Plans

- Includes strategy to ensure systems perform as expected.
- Multiple items may be necessary.
- Preventive, predictive, corrective.
- Run to fail is an option.
- Spare inventory strategy.


SUB-T PROVIDER
F1
T1
12.47/4.16 KV
F2
SS
4.16/480
BATT CHRG
BATT BANK
PROTECTION & CONTROL
WR 1
CKT. 1
CAP BANK
CAP 1
101
MAIN BUS
201
301
401
202
302
402
WR 42
INDUSTRIAL CUSTOMER
CKT2
CKT3
CKT 4
WR 21
WR 41
403
CKT21
CKT22
CKT23
CKT31
CKT32
CKT33
CKT41
CKT42
CKT 43
F21
F22
F23
F31
F32
F33
F41
F42
F43
T21
T22
T23
T31
T32
T33
T41
T42
T43
VR 41
RES
RES
WATER TREATMENT
WELL #1
RES
RES
WELL #2
RES
VOLTAGE REG.
RURAL CUST

Equipment

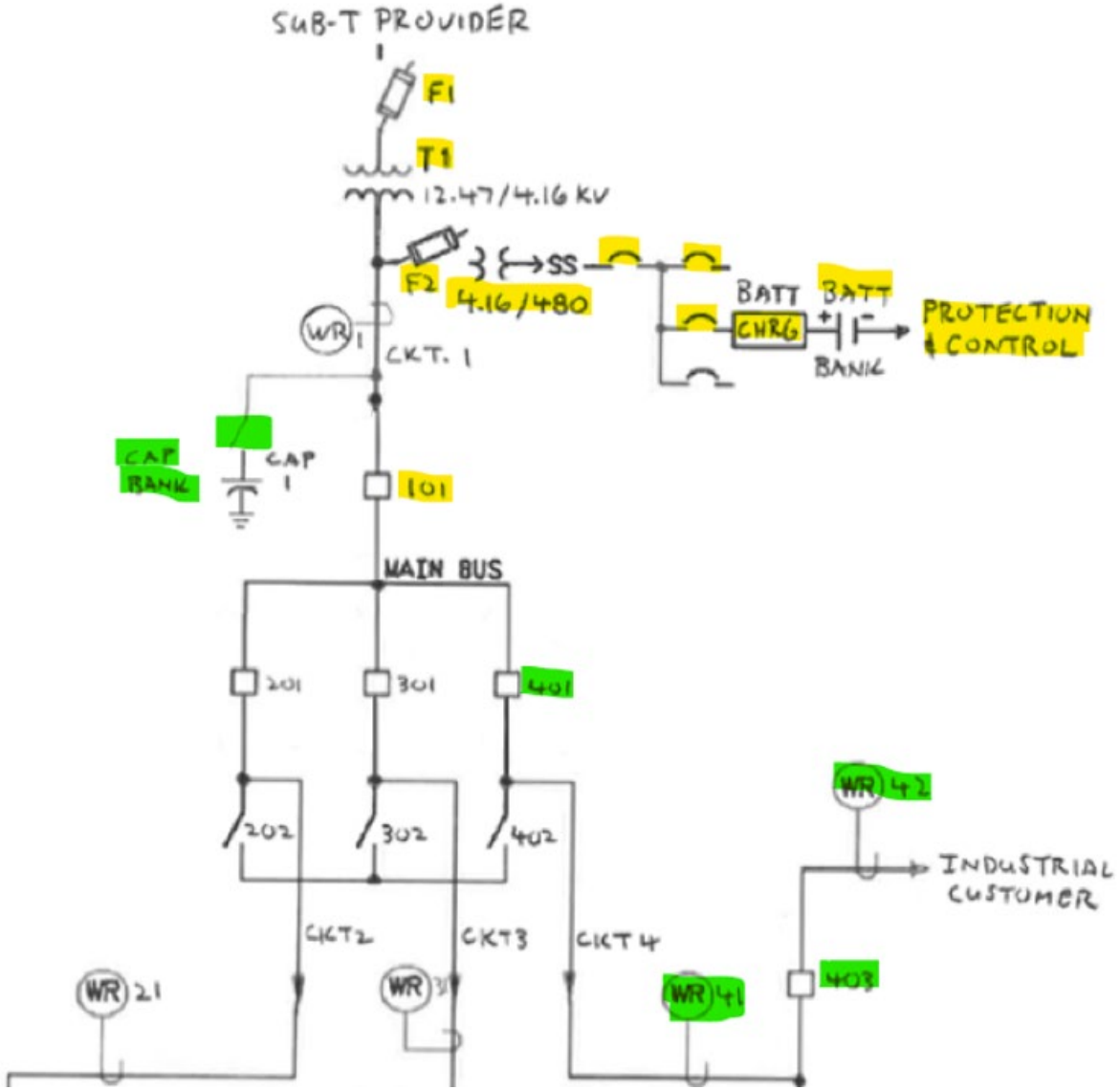
- Transformers
- Fuses
- Battery Charger
- Switches
- Capacitor Bank
- Breakers
- Voltage Regulators
- Relays
- Meters

Criticality Ranking

- Reliability – 1) Full system outage, 2) 10-50% customers out or loss of key customer, 3) Less than 10% of customers out, redundant 4) No outage
- Safety – 1) Immediate danger to public, 2) Immediate danger to employees, 3) Possible danger to public or employees, 4) not applicable

Criticality Ranking

- Compliance – 1) Immediate non-compliance, 2) Imminent non-compliance, 3) Possible non-compliance, 4) not applicable
- Cost – 1) $100k or more, 2) $25 to $99k, 3) Less than $25k, 4) Less than $1k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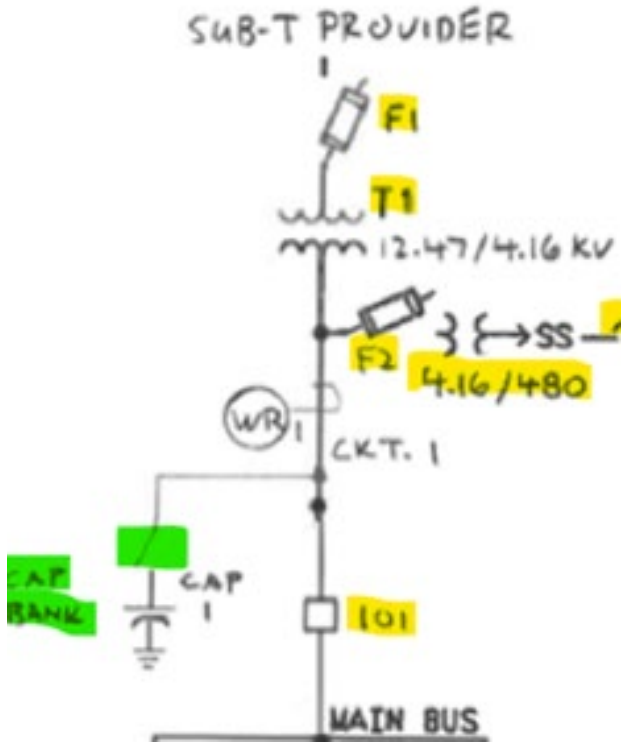
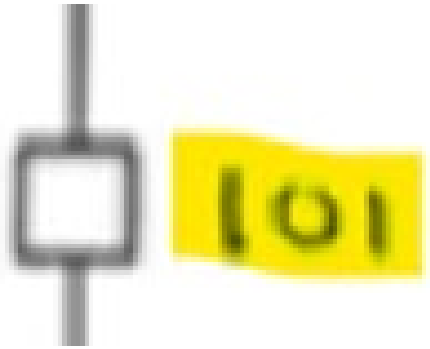
INDUSTRIAL CUSTOMER
CKT2
CKT3
CKT 4
WR 21
WR 41
403

Criticality Ranking

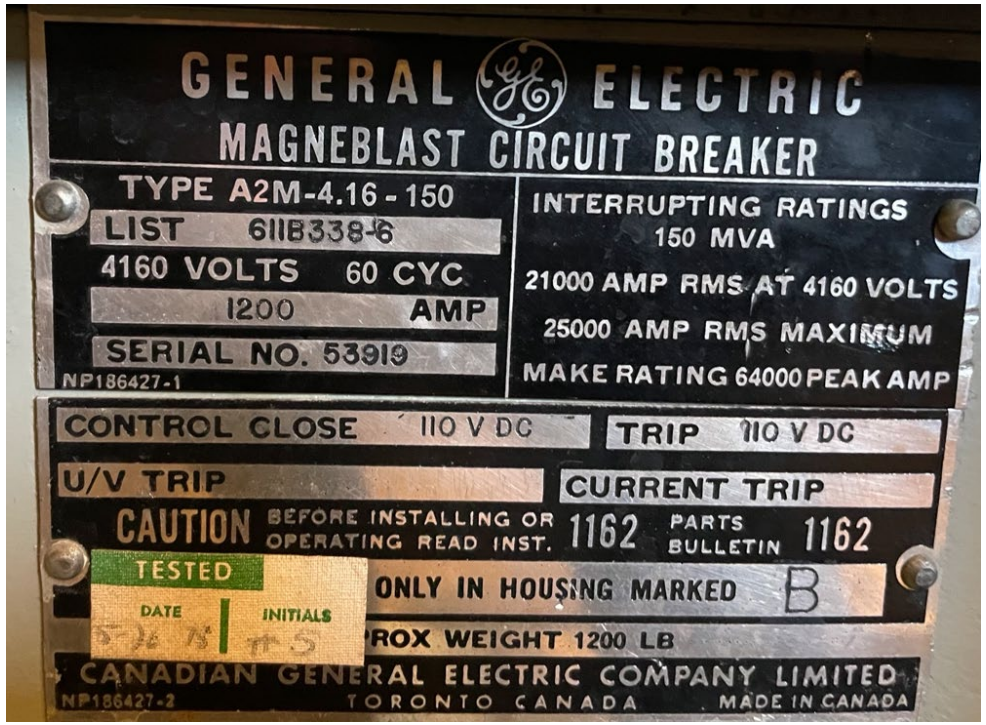
		EQUIPMENT CRTICALITY				
EQUIPMENT ID	EQUIPMENT DESCRIPTION	RELIABILITY	SAFETY	COMPLIANCE	COST	SCORE
CITY-01	CITY ELECT DIST	0	0	0	0	0
CITY-01-CKT1	CITY ELECT DIST CIRCUIT 1	0	0	0	0	0
CITY-01-CKT1-5301	CITY ELECT DIST CIRCUIT 1 FUSE 1	1	4	4	4	1
CITY-01-CKT1-5302	CITY ELECT DIST CIRCUIT 1 BKR 101	1	4	4	2	1
CITY-01-CKT1-5602	CITY ELECT DIST CIRCUIT 1CAP BANK SW	3	4	4	3	3
CITY-01-CKT1-5801	CITY ELECT DIST CIRCUIT 1 CAP BANK	3	4	4	2	2
CITY-01-CKT1-5901	CITY ELECT DIST CIRCUIT 1 XFMR 1 (12.47/4.16)	1	4	4	1	1
CITY-01-CKT1-5902	CITY ELECT DIST STAT SVC FUSE 2	1	4	4	4	1
CITY-01-CKT1-5903	CITY ELECT DIST CIRCUIT 1 INST XFMR 1	1	4	4	4	1
CITY-01-CKT2	CITY ELECT DIST CIRCUIT 2	0	0	0	0	0

		EQUIPMENT CRTICALITY				
EQUIPMENT ID	EQUIPMENT DESCRIPTION	RELIABILITY	SAFETY	COMPLIANCE	COST	SCORE
CITY-01-CKT1-5302	CITY ELECT DIST CIRCUIT 1 BKR 101	1	4	4	2	1





Metal Clad Switchgear Breaker

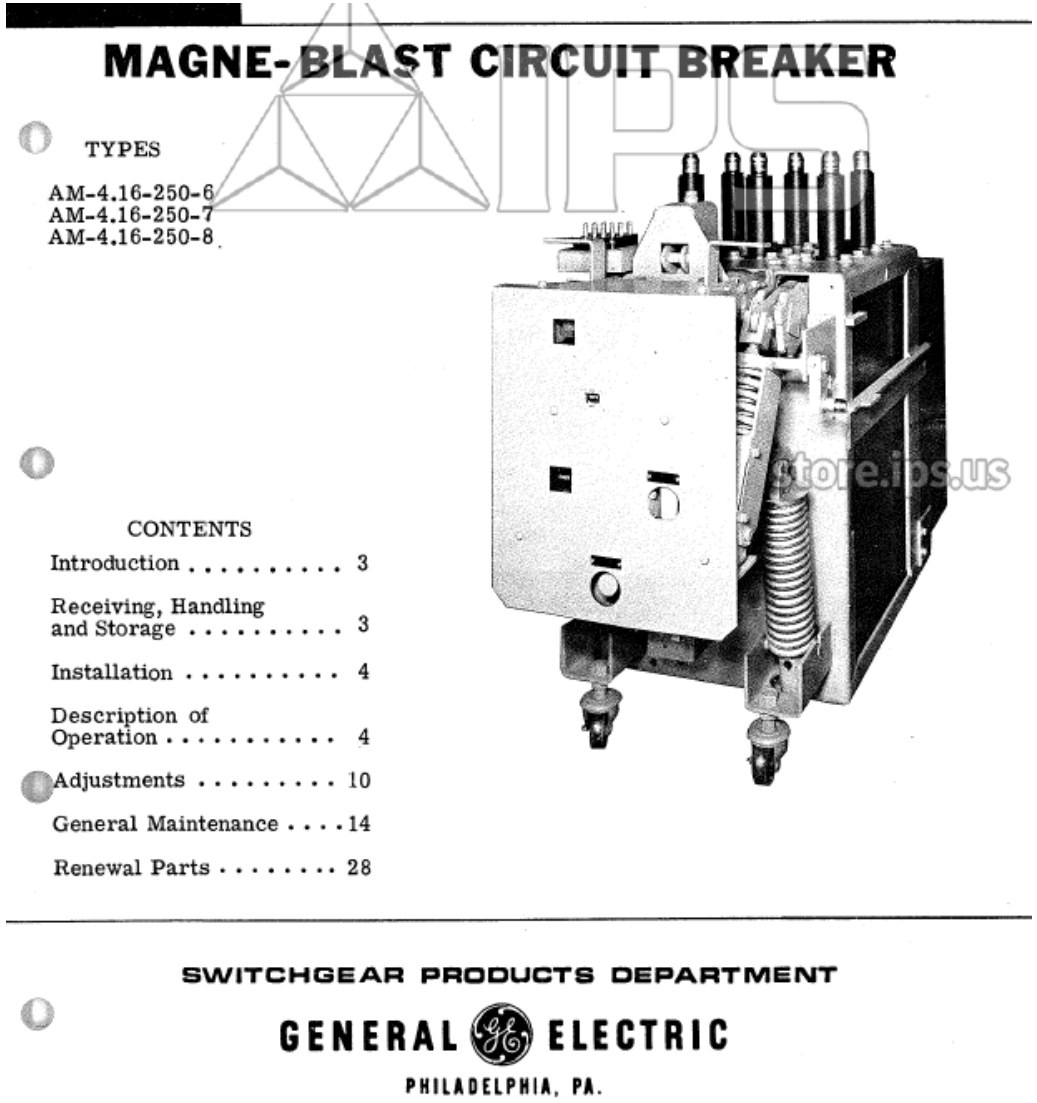


Failure Modes and Effects Analysis

- How can the equipment fail?
  - Not open
  - Not close
  - Arc/explode/catch fire
- Effects of failure?
  - Damage to unprotected circuit
  - Outage
  - Injury, damage other equipment

O&M Manual

- Use OEM recommendations.
- Experience of personnel.
- How is this used?
- What conditions?
- Counter or time based?



MAGNE-BLAST CIRCUIT BREAKER

TYPES

AM-4.16-250-6
AM-4.16-250-7
AM-4.16-250-8

CONTENTS

SWITCHGEAR PRODUCTS DEPARTMENT

GENERAL ELECTRIC

PHILADELPHIA, PA.

Maintenance Activities

- What steps can be taken to mitigate the failure?
  - Exercise
  - Thermography
  - Clean
  - Lubricate
  - Test

Maintenance Procedure

SITE	MNT. ITEM NUMBER
GOTHAM CITY	0001

EQUIPMENT DESCRIPTION	EQUIPMENT ID
CITY ELECT DIST CIRCUIT 1 BKR 101	CITY-01-CKT1-5302

FREQUENCY	PM TITLE	REGULATORY
5 YEARS	AIR CIRCUIT BREAKER SERVICE	NO

SWITCHING REQUIRED?	EQUIPMENT STATUS	EFFECTIVE DATE
YES	OUT OF SERVICE	4/1/2024

REVISION	DATE	CHANGES

REFERENCES
Magneblast Metal-Clad Switchgear Manual GEH-1802X

APPROVAL	OWNER
Electrical Superintendent	City Electrician

1. **PURPOSE**
   1.1. Why the maintenance is being performed and the expected results.

2. **PRECAUTIONS AND LIMITATIONS**
   2.1. Safety steps, impact to end users, recommended time/season to complete work.

3. **INFORMATION**
   3.1. Photos, drawings, etc.

4. **INSTRUCTIONS**
   4.1. Maintenance steps.
   4.2. Return to serivce.

5. **MATERIALS**
   5.1. Bill of materials required to complete work.

Record Results

- Create reports
  - Test results
  - Photographs
  - Free text
  - Dates
  - Who performed
  - Be thorough and specific
  - Cost

Questions / Discussion