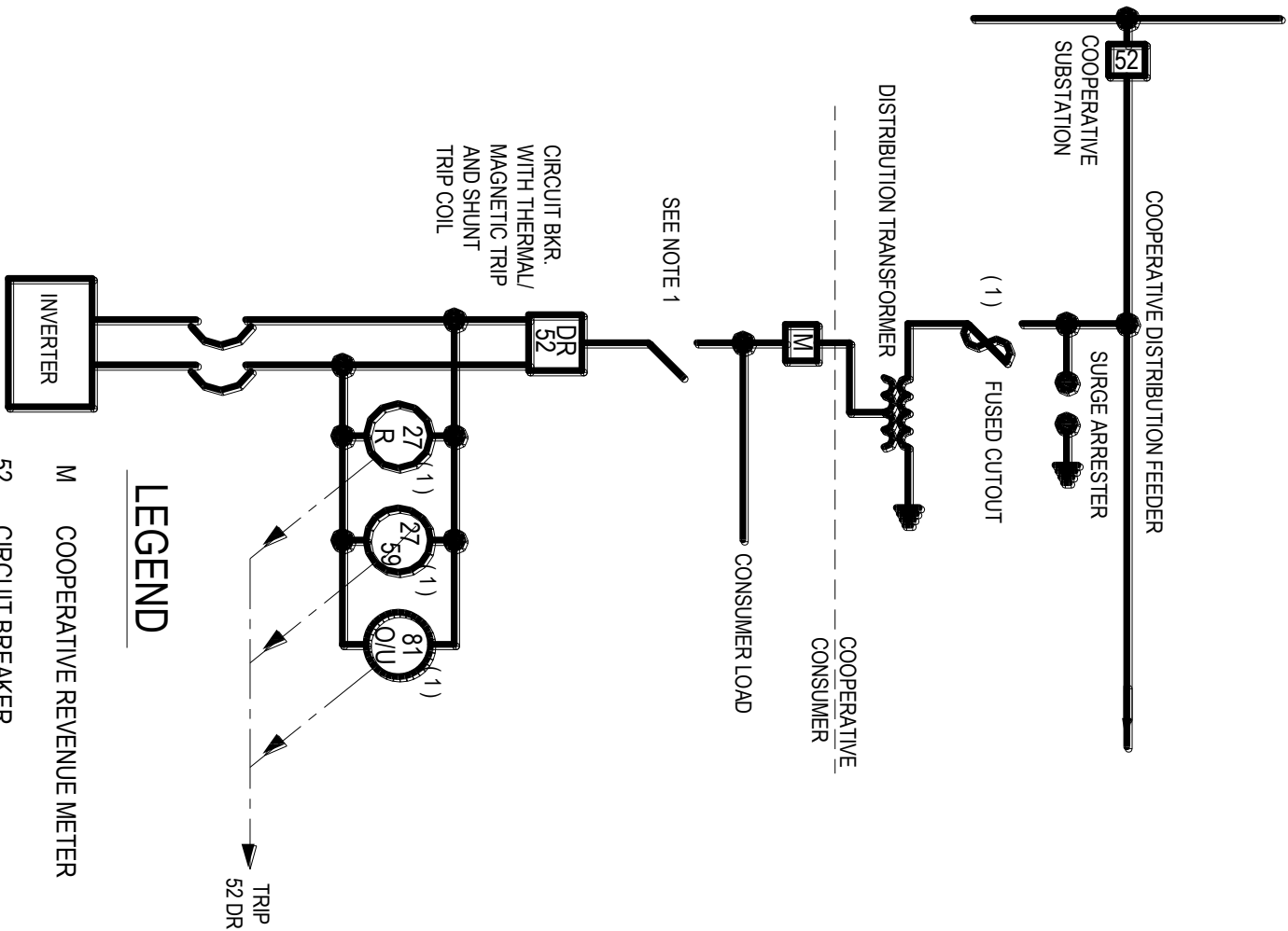


EXHIBIT 1

GENERAL PROTECTION REQUIREMENTS

Figure

- 1 Protection for a three-phase synchronous generator
- 2 Protection for a single-phase induction generator
- 3 Protection for a three-phase induction generator
- 4 Protection for a single-phase inverter
- 5 Protection for a three-phase inverter



LEGEND

- M COOPERATIVE REVENUE METER
- 52 CIRCUIT BREAKER
- 27R INSTANTANEOUS UNDERVOLTAGE RELAY
- 27/59 TIME UNDER/OVER VOLTAGE RELAY
- 81 O/U OVER/UNDER FREQUENCY RELAY

NOTE:

1. SWITCH MUST BE PADLOCKABLE AND AVAILABLE TO THE COOPERATIVE AT ALL TIMES

Revisions
RFG 1/9/06

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Harrisburg, Pennsylvania

Drawn: DRF

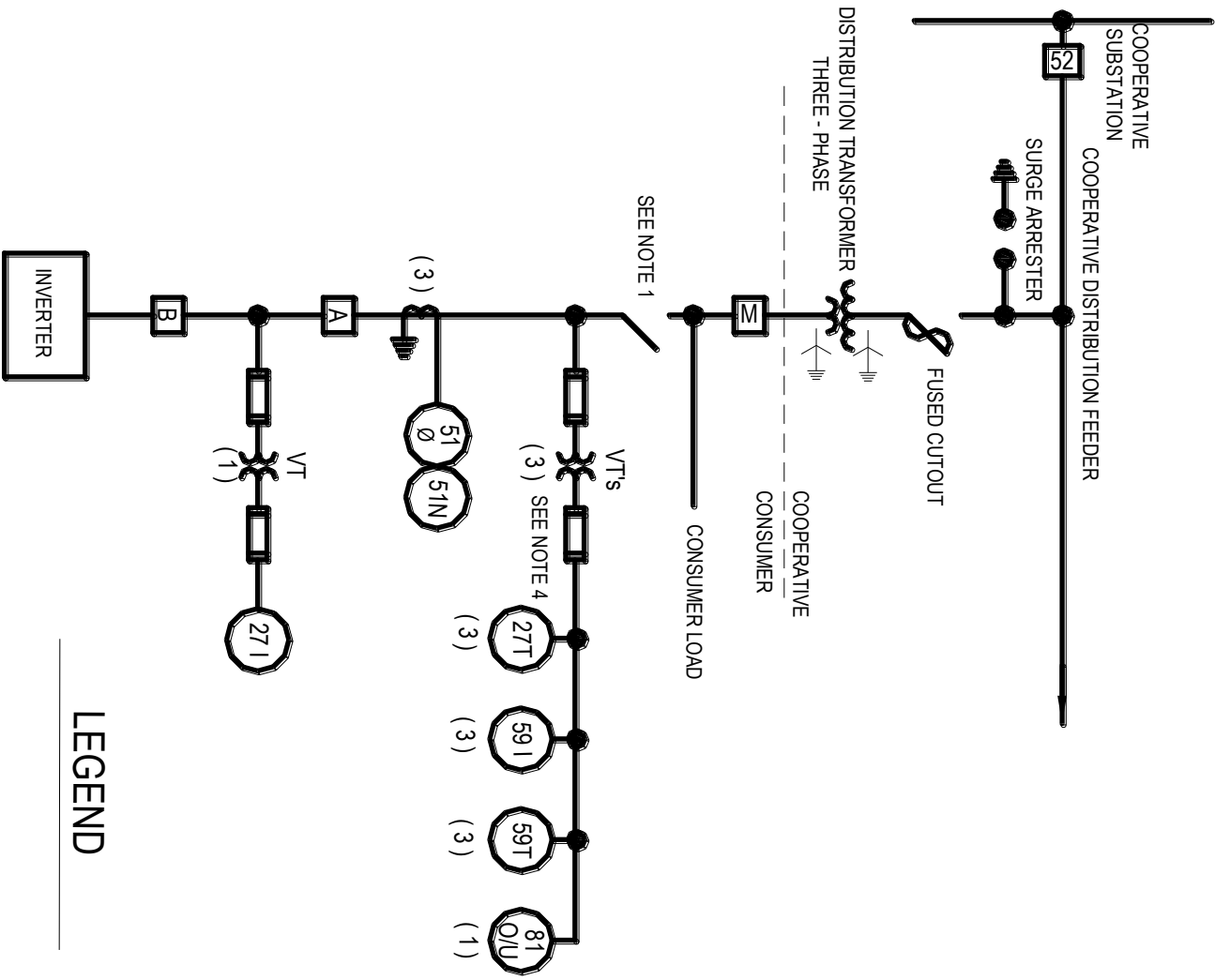
Checked:

Approved: BH

Date: 11-03-05

TYPICAL PROTECTION
EXAMPLE FOR SINGLE
PHASE INVERTER

Dwg. No. CCS - IPD - 01



- NOTE:
1. SWITCH MUST BE PADLOCKABLE AND AVAILABLE TO THE COOPERATIVE AT ALL TIMES
 2. ALL PROTECTIVE RELAYING TRIPS BREAKER A
 3. SOURCE BEHIND INVERTER CAN BE BATTERY, FUEL CELL, PV OR OTHER DC SOURCE, POWER CONDITIONING SHOULD BE DONE BEFORE INVERTER
 4. IF GENERATION IS LESS THAN 100 KW USE ONE EACH OF 27T, 59I, 59T AND ONE VT

- LEGEND
- 27 I INSTANTANEOUS UNDERVOLTAGE
 - 27 T TIME UNDERVOLTAGE
 - 51 TIME OVERCURRENT - PHASE
 - 51 N TIME OVERCURRENT - GROUND
 - 52 CIRCUIT BREAKER
 - 59 I INSTANTANEOUS OVERVOLTAGE
 - 59 T TIME OVERVOLTAGE
 - 81 O/U OVER / UNDER FREQUENCY
 - M COOPERATIVE REVENUE METER

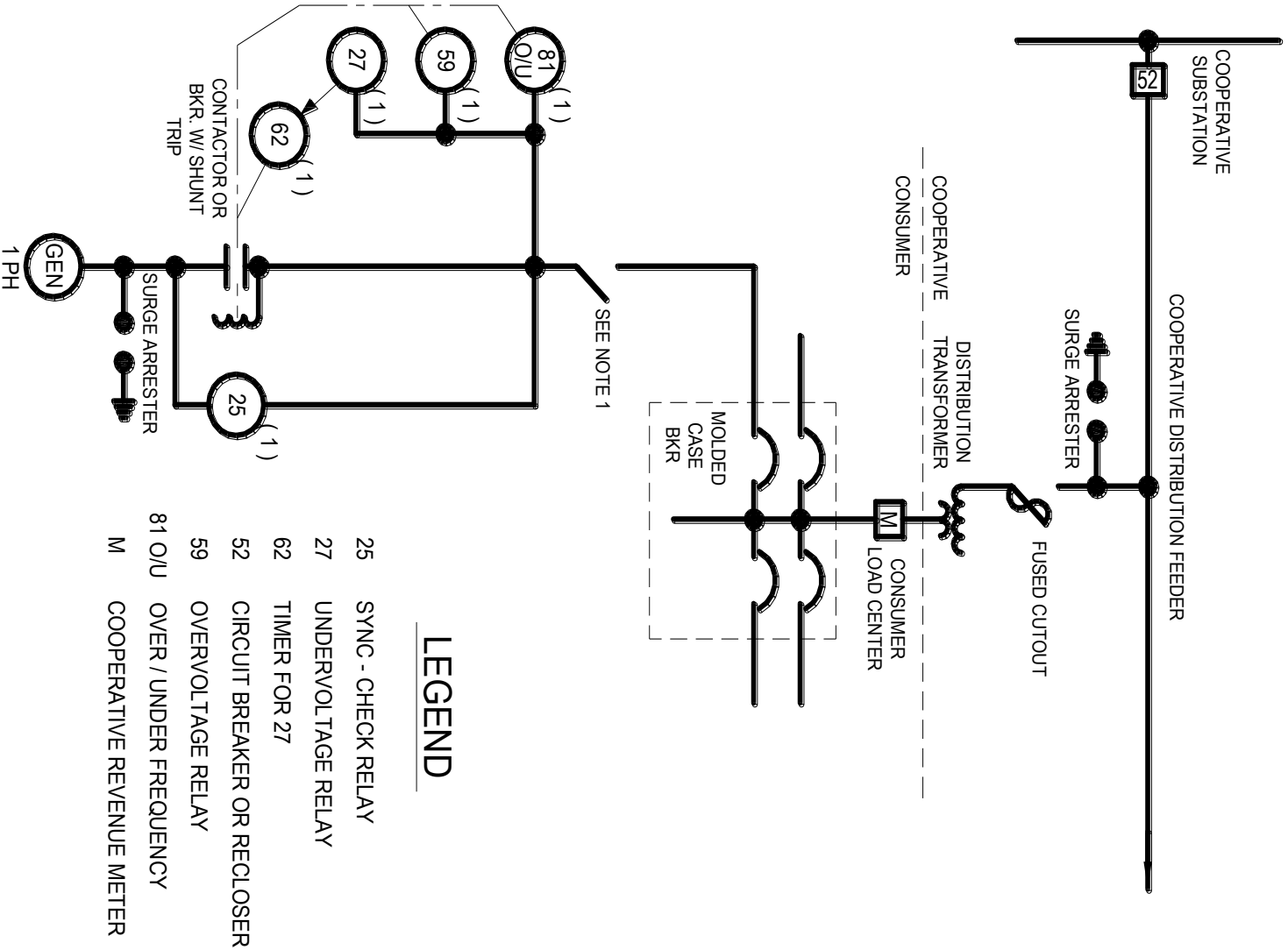
TYPICAL PROTECTION
 EXAMPLE FOR 3 - PHASE
 INVERTER WITH WYE GROUND -
 WYE GROUND TRANSFORMER

Dwg. No. CCS - IPD - 02

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 Date: 11-03-05

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LEGEND

- 25 SYNC - CHECK RELAY
- 27 UNDERVOLTAGE RELAY
- 62 TIMER FOR 27
- 52 CIRCUIT BREAKER OR RECLOSER
- 59 OVERVOLTAGE RELAY
- 81 O/U OVER / UNDER FREQUENCY
- M COOPERATIVE REVENUE METER

NOTE:

1. SWITCH MUST BE PADLOCKABLE AND AVAILABLE TO THE COOPERATIVE AT ALL TIMES

TYPICAL PROTECTION
EXAMPLE FOR SINGLE PHASE
INDUCTION GENERATOR

Dwg. No. CCS - IPD - 03

Drawn: *DRF*

Checked:

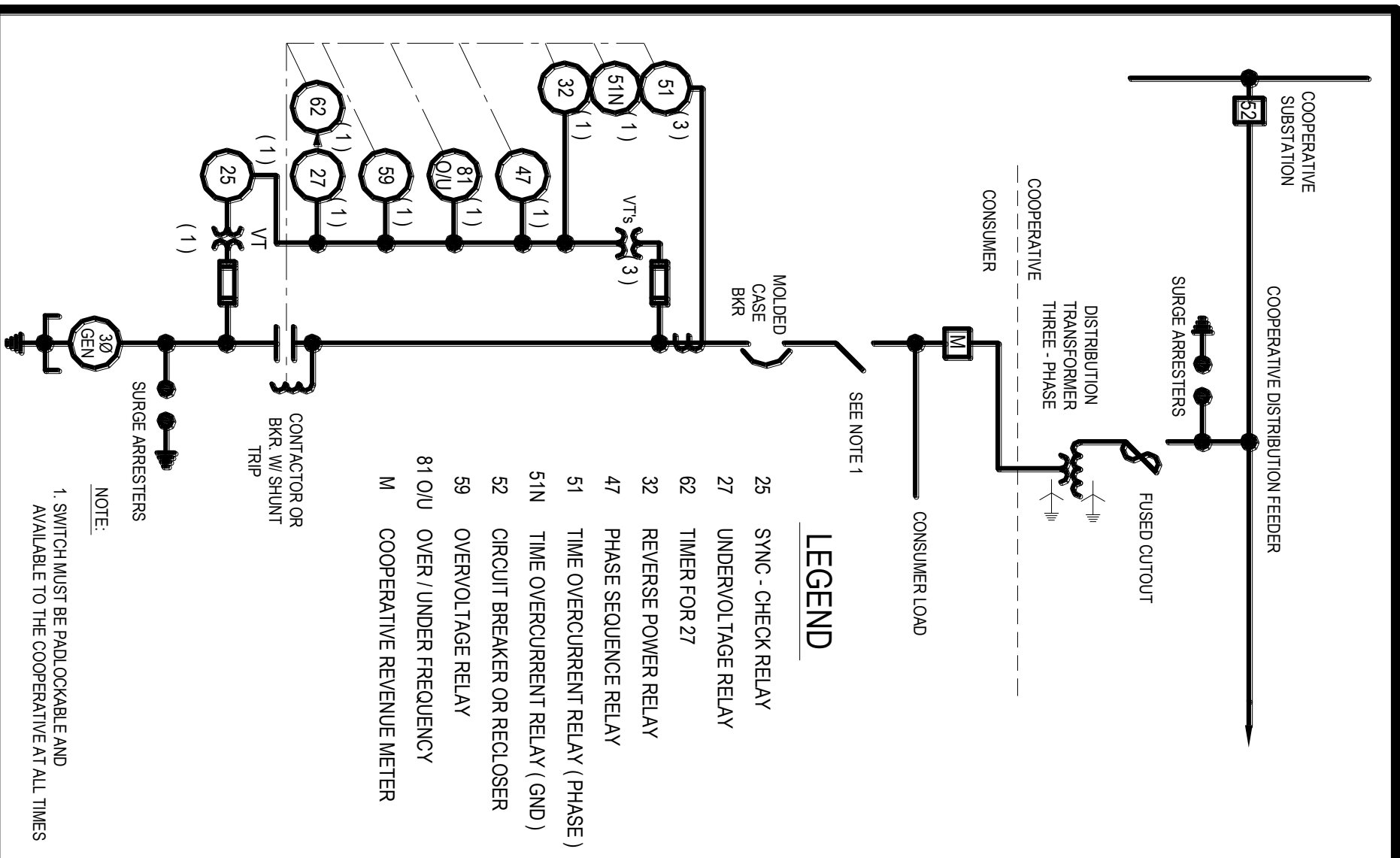
Approved: *BH*

Date: 11-03-05

ALLEGHENY ELECTRIC COOPERATIVE

Harrisburg, Pennsylvania

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LEGEND

- 25 SYNC - CHECK RELAY
- 27 UNDERVOLTAGE RELAY
- 32 TIMER FOR 27
- 47 REVERSE POWER RELAY
- 51 PHASE SEQUENCE RELAY
- 51N TIME OVERCURRENT RELAY (PHASE)
- 52 TIME OVERCURRENT RELAY (GND)
- 59 CIRCUIT BREAKER OR RECLOSE
- 81 O/U OVERVOLTAGE RELAY
- M OVER / UNDER FREQUENCY COOPERATIVE REVENUE METER

NOTE:

1. SWITCH MUST BE PADLOCKABLE AND AVAILABLE TO THE COOPERATIVE AT ALL TIMES

Revisions
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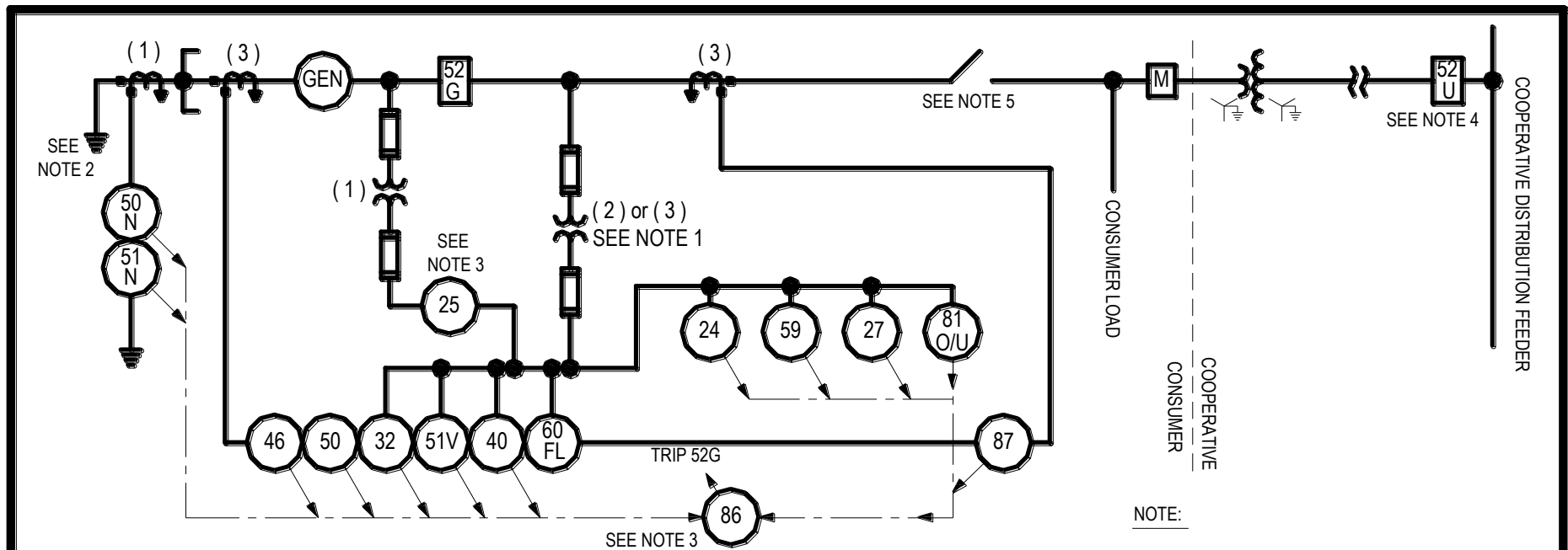
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TYPICAL PROTECTION
 EXAMPLE FOR THREE - PHASE
 INDUCTION GENERATOR

Dwg. No. CCS - IPD - 04



LEGEND

M	COOPERATIVE REVENUE METER	51N	TIME OVERCURRENT GROUND RELAY
PROTECTIVE RELAYS			
24	VOLTS / HZ RELAY	51V	VOLTAGE CONTROLLED TIME OVERCURRENT RELAY
27	UNDERVOLTAGE RELAY	59	OVERVOLTAGE RELAY
32	REVERSE POWER (ANTI - MOTORING) RELAY	60FL	FUSE LOSS DETECTION RELAY
40	LOSS OF FIELD RELAY	81 O/U	OVER / UNDER FREQUENCY RELAY
46	NEGATIVE SEQUENCE OVERCURRENT RELAY	86	LOCKOUT RELAY
50	INSTANTANEOUS OVERCURRENT RELAY	87	DIFFERENTIAL RELAY
50N	INSTANTANEOUS OVERCURRENT GROUND RELAY	CONTROL RELAYS :	
		25	AUTOMATIC SYNCHRONIZER OR SYNC - CHECK RELAY
		52	BREAKER

NOTE:

1. VT's CAN BE CONNECTED WYE OR OPEN DELTA
2. GENERATOR GROUNDING SHOWN IS LOW IMPEDANCE, HIGH IMPEDANCE GROUNDING CAN BE USED IF DESIRED
3. RELAYING DEVICES SHOWN ARE ALL PART OF A MULTI - FUNCTION RELAY EXCEPT FOR DEVICES 25 AND 86. FUNCTIONS CAN BE INCREASED OR DECREASED AS DICTATED BY THE PARTICULAR APPLICATION
4. IF 52U IS RECLOSING CIRCUIT BREAKER, RECLOSING SHOULD BE SUPERVISED BY A SYNC - CHECK RELAY (DEVICE 25)
5. SWITCH MUST BE PADLOCKABLE AND AVAILABLE TO THE COOPERATIVE AT ALL TIMES

Revisions
RFG 1/9/06

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Harrisburg, Pennsylvania

Drawn: DRF
Checked: _____
Approved: BH
Date: 11-03-05

TYPICAL PROTECTION SCHEME
FOR SMALL SYNCHRONOUS GENERATOR
INDUCTION GENERATOR
< 1 MW

Dwg. No. CCS - IPD - 05