RMS CURRENT MEASUREMENT

with

SURE TRIP
RETRO KITS

Circuit Breaker
Solid State Controls
with

SURE TRIP LOGIC

The Sure Trip Solid State Tripping Systems Have Been Designed, Tested
And Produced To all Applicable NEMA and UL Standards.

PATENT NO. 4,866,557

"ANSI C37.59"

NUCLEAR APPROVED
CLASS 1E SAFETY RELATED
HARSH ENVIRONMENT IEEE 323-74 AND IEEE 344-75

SURE TRIP, INC
24048 North Carolina Highway 73
Albemarle, North Carolina 28001

TELEPHONE
TOLL FREE: (800) 382-5864
FAX: (704) 983-6128

SURE TRIP

SOLID STATE RETROFIT KIT
TECHNICAL ASPECTS

SURE TRIP SOLID STATE BREAKER RETRO-KITS

SURE TRIP RETRO-KITS

The modern alternative for circuit breaker upgrading instead of replacement, at a fraction of the cost. **SURE TRIP RETRO-KITS** are comprised of the highest quality engineered components to easily retrofit circuit breakers regardless of the original quality or manufacturer.

FEATURE FOR FEATURE

Outperforms all other retrofit competitors due to superior design, versatility and full range on-line performance benefits and is available in 40 & 50 cycle.

SURE TRIP RETRO-KITS OFFER THESE EXCLUSIVE FEATURES

1.	Circuit design provides universality of time-current settings to allow one model for the full range of current settings required by normal applications.
2.	Rotary switch adjustments provide precise, repeatable settings.
3.	Circuit design allows switch adjustments while in operation without tripping the breaker.
4.	Each printed circuit board is specially treated to prevent contamination and signal leakage.
5.	Metal enclosure, as standard, to shield against noise, magnetic interference and contamination.
6.	Target diagnostic circuitry is designed to provide maximum protection capability to reduce system downtime by analyzing any over current fault and visually identifying it's cause as an overload, short circuit or ground fault.
7.	A Long Time pickup timing indicator, as standard, to aid in identifying an over current condition in process.
8.	Circuit design allows both local and remote fault indication.
9.	An I squared T Short Time switch, as standard, to provide maximum coordination with the inrush currents of motors and transformers.
10.	Design circuitry built for protection against RF radiation, transient voltage, and harmonic problems.
11.	Current sensors are epoxy encapsulated as standard.
12.	Current sensors are designed to mount on the rear of the breaker for maximum ease of retrofitting circuit breakers.
13.	All magnetic latches and flux shifters are manufactured to stringent design criteria for mounting on a wide range of circuit breakers with minimum expense.
14.	Magnetic latches and flux shifters are manufactured with metals that help eliminate corrosion to prevent inoperable mechanisms.
15.	Portable test set to facilitate in-house secondary testing of in service SURE TRIP units at full current rating 0-60 amps.

Our full range of **SURE TRIP RETRO-KITS** will allow our customers to retro-fit any circuit breaker with the features required for all the various applications demanded with both cost and feature benefits which are unprecedented in the marketplace.

RMS MEASUREMENT OF SINUSOIDAL AND NON-SINUSOIDAL CURRENT

The **SURE TRIP RMS 85 LOGIC CONTROL** monitors current overloads accurately for electrical distribution systems including AC & DC variable speed drives, induction heating, and other loads that cause Non-Sinusoidal wave distortion.

SURE TRIP RETRO-KITS

CURRENT SENSORS

The current sensors are designed to be mounted on the rear bus-bar stabs of the circuit breaker. They produce a current output proportional to the load current of the breaker. Since the **UNIVERSAL SURE TRIP LOGIC CONTROL** requires only nominal signal of 5A per breaker frame, the following current sensor ratings are available. Other ratings available as special order at no additional charge.

FRAME SIZE AMPERES	SENSOR TAP	AMPERE RANGE
600	225/600	45-600
1600	1600	320-1600
3200	3200	640-3200
4000	4000	800-4000

The **SURE TRIP CONTROLS** are universally adjustable and are compatible with any 5 amp secondary current sensor. If load conditions change, it is only necessary to readjust to Amp Tap Switch located in the Power Box and not to replace the current sensors.

MAGNETIC LATCH AND FLUX SHIFTER

Our **MAGNETIC LATCH** and **FLUX SHIFTERS** are manufactured to mount on all standard breaker frames with minimal time and expense. With a minimum of 6 lbs. latching and tripping, they will trip the breaker when required and at the same time, eliminate nuisance tripping.

RMS 100 OEM REPLACEMENT TRIP UNIT

The RMS 100 replacement trip unit is supplied with various full load pick up characteristics to enable the replacement of obsolete OEM trip units. By utilizing the existing current sensors and/or magnetic latch, the circuit breaker can be upgraded to modern technology with minimal cost and downtime.

TEST SET

A full function test set has been developed for use with the **SURE TRIP LOGIC CONTROL**. It will check the time current characteristics of the logic programmer at an infinite number of points along its curves, test the programmer diagnostic circuitry, current sensor continuity and flux shifter operation. The test set is a rugged, lightweight, portable device designed specifically with the service man in mind.
*The Test Set operates, at full load, at more than 60 amps when attached to the RMS 85. The Test Set is designed to handle current amplitudes according to the Long Time trip curves.

COMMUNICATIONS CONNECTOR

The optional Communications Connector provides the user with the ability to interface the SURE TRIP Logic with an existing communications system. The unit provides a normally open dry contact, which will close on a fault condition and will remain closed until the target indicator reset switch is pressed. Contacts are provided for each target indicator, which may include ‘Short Circuit’, ‘Overload’, and ‘Ground Fault’. A contact for ‘Trip’ can also be provided.
The relays are setup to close each time the target indicators flip and the logic trips. On startup conditions, the Instantaneous trip may not be indicated by relay closure due to the high speed that it occurs. When the elapsed time exceeds 75 milliseconds, relay closure is guaranteed. To provide for the relays to be reset, current must be flowing to the logic at a level of at least 30% of the Current Transformer rating.

RMS-85 SOLID STATE PROGRAMMER

The SURE TRIP solid state programmer is a static trip device designed to provide more precise tripping characteristics, when retrofitted on low voltage air circuit breakers, than the thermal magnetic trip units, which it replaces.

The SURE TRIP programmer comes in a two (2) unit configuration, the control portion and the power box. The control portion illustrated in Drawing 2.1, comes with Long Time, Short Time, and Instantaneous tripping functions as standard equipment. A Ground Fault option is also available with this device. I square T function, Long Time pick up light, Trip indicators, and a trip indicator reset button are also standard. All the switches can be adjusted while the breaker is in operation without causing a nuisance trip.

The power box consists of two (2) possible adjustment controls. An amp tap setting which can be set to control the current settings without adjusting the current sensor taps and an optional ground fault burden setting. The power box drawing can be found in Drawing 2.2.

LEGEND TO DRAWINGS 2.1 AND 2.2

1. Instantaneous Adjustment
2. Short Time Adjustment
3. Long Time Adjustment
4. Optional Ground Adjustment
5. Optional Ground Fault Delay Band Adjustment
6. Target Reset Button
7. Long Time Delay Band Adjustment
8. Trip Indicating Targets
9. Short Time Delay Band Adjustment
10. Pick-up LED
11. I Square T Switch
12. Amp Tap Adjustment
13. Ground Fault CT Setting

#1 INSTANTANEOUS PICK-UP

This function determines the level at which the breaker will trip without intentional time delay. This instantaneous interruption occurs only as a result of a severe short circuit.

#2 SHORT TIME PICK-UP

This function adjustment controls the amount of high current the breaker will carry for short periods of time without tripping. This function can be set at 2 to 10 times current sensor rating times the amp tap switch setting.

Example:
1600 amp current sensor, with amp tap switch set at .75 = 1200 amps. Short Time Pick-up switch set at 8 times provides a 9,600 amp short time trip setting.

#3 LONG TIME PICKUP

The Long Time Pick-up switch provides an additional current adjustment capability for the breaker with six steps from 40% to 100%. Changing this setting does not affect any other function.

Example:
1600 amp current sensor, with amp tap switch set at .75 = 1200 amps. With Long Time Pick-up set at .4, the current rating on long time is now at 480 amps, with short time and instantaneous coordinated to 1200 amp.

#4 GROUND FAULT PICK-UP

This six-step adjustable function controls the level of ground fault current (100 to 1200 amp) at which circuit interruption will occur, regardless of current sensor rating. This complies with the 1978 National Electric Code that no trip point exceeds 1200 amps.

#5 GROUND FAULT DELAY

This three-step adjustment allows a predetermined time delay to the trip point once the ground fault pick-up has been reached.

#6 TARGET RESET SWITCH

This switch resets the targets trip indicators after a fault condition.

#7 LONG TIME DELAY

This three-step time adjustment varies the time that the breaker will operate under sustained overload without tripping.

#8 FAULT TRIP INDICATORS

These fault indicators identify the cause of an over-current trip and help to reduce system down time. Electronic flip-flag indicators analyze the fault and provide a memory of the trip. As an option, fault indicators can be remote mounted and wired to the breaker.

#9 SHORT TIME DELAY

This three-step delay adjustment provides a further coordination between circuit breakers. It allows the breaker a time interval before responding to the selected short circuit current levels.

#10 LONG TIME TIMING LIGHT

This feature provides visual indication of an overload condition and pick-up of the long time timing function.

#11 SHORT TIME I SQUARE T FUNCTION

The Short Time I Square T switch provides the ability of introducing an additional energy ramp into the short time function delay. This function provides maximum coordination benefits, especially for motor start applications. This allows the short time function to be set at lower levels so tripping will not occur on motor start.

#12 AMP TAP SWITCH

This standard three-step adjustable ampere setting from 50% to 100% varies the level of current the logic receives from the current sensor. Changing this setting has the same effect as changing the value of the current sensor. Note when testing single phase you must maintain 30% of the sensor tap rating to maintain tolerance.

Example:
1600 amp current sensor, with the amp tap switch set at .5, logic control now monitors 800 amp maximum continuous current. Long time, short time, and instantaneous pick-ups are coordinated to the 800 amp. The Logic must have 240 amp to remain in tolerance. The .4 and .52 Long Time Pick-Up will be out of the +/- 10% tolerance at the optional .5 Amp Tap setting when testing on single phase.

#13 GROUND BURDEN SETTING

This six-step adjustable setting allows the ground function to be coordinated to the current sensor rating. The amp tap switch does not affect the Ground Fault settings of the logic.

TEST PROCEDURE FOR PROGRAMMABLE LOGIC CONTROLLER USING THE SURE TRIP SECONDARY TEST SET

1. Insert AC cord into the test set and connect to a 120 volt outlet.
2. Using the test set wiring harness, connect to the test set and to the logic box to be tested.
3. Turn on test set by placing the "Power" switch to the up position.
4. Reset the "Trip Timer" by placing the "Fault" switch to the "Reset" position.
5. If an external ammeter is not used, make certain that a jumper is placed between the "External Ammeter" binding posts.
6. After testing a selected pick-up current or delay function, it is advised to return the "Variac" control to zero before proceeding to the next test.
7. When testing pick-up currents, start by selecting "Lo" on the "Range" switch. With the "Variac" at zero turn clockwise until the unit trips or the pick-up light turns on. If the logic controller does not trip at this setting, return the "Variac" to zero and select the "High" position on the "Range" switch and proceed with the test.
8. Testing of each function is described in more detail on the following pages.
9. The Logic can also be tested with the Amptector secondary test set. An adaptor plug can be supplied by SURE TRIP that allows for connection between the logic and the test set.

Drawings Legend

Drawing 1 - Function Block Diagram

Drawing 2.1 - Front Panel Layout For Control Box

Drawing 2.2 - Front Panel Layout For Power Box

Drawing 3 - Wiring Diagram For Systems Without Ground Fault Protection

Drawing 4 - Wiring Diagram For 3 Wire Systems With Ground Fault Protection

Drawing 5 - Wiring Diagram For 4 Wire Systems With Ground Fault Protection

LONG TIME FUNCTION

PICK-UP TEST

1. Test Set> Set the "Phase Selector" switch to the desired phase and the "Ground Fault" switch to the "Defeat" position.
2. Logic Box> Set the "Long Time Delay" switch to "MIN".
3. Test Set> Place the "Fault" switch in the "Test" position and slowly increase the "Variac" from "0" until the Long Time Pick-Up LED on the logic box lights.
4. Observe the reading on the "Ammeter" just as the pick-up LED lights. Compare the reading to that of Chart 2A. Return "Variac" control to zero and place the "Fault" switch to the "Reset" position. Repeat for other phases or pick-up settings if desired.

LONG TIME DELAY

1. Test Set> Set the "Phase Selector" switch to the desired phase and the "Ground Fault" switch to the "Defeat" position.
2. Logic Box> Set the "Long Time Delay" to the desired setting, "MIN", "INT", or "MAX".
3. Test Set> Place the "Fault" switch in the "Test" position and adjust the "Variac" control to 300% of the long time pick-up. Place "Fault" switch in the "Reset" position to reset the "Trip Timer"
4. Test Set> Place "Fault" switch in the "Test" position until the "Open" lamp lights and the logic trips. The "Trip Timer" will indicate the elapsed time. Compare this time to that of Chart 1A or the trip curves. Repeat for other phases or switch settings if desired.
5. Return the "Variac" to "0" and place the "Fault" switch in the "Reset" position.

Chart 1A – Long Time Delay

Set Secondary Current to 300% of Chart 2A.	Min	8-12 Sec
	Int	20-30 Sec
	Max	60-90 Sec

Chart 2A – Long Time Pick-up Currents

Amp Tap	Test Current	.4	.52	.64	.76	.88	1.0
.5	2.50	1.00	1.30	1.60	1.90	2.20	2.50
.75	3.75	1.50	1.95	2.40	2.85	3.30	3.75
1.0	5.00	2.00	2.60	3.20	3.80	4.40	5.00

SHORT TIME FUCTION

PICK-UP TEST

1. Logic Box> Set I square T switch to "OUT" and long time delay switch to "MAX".
2. Test Set> Set the "Phase Selector" switch to the desired phase and set the "Ground Fault" switch to the "Defeat" position.
3. Test Set> Place the "Fault" switch in the "Test" position and slowly increase the "Variac" from "0" until the logic trips and the "Open" lamp lights. Observe the reading on the "Ammeter" at the moment the breaker trips and compare this to the value in Chart 2B. Return the "Variac" to "0" and place the "Fault" switch in the "Reset" position.
4. Test Set> Repeat for other phases or pick-up settings if desired.

SHORT TIME DELAY

1. Logic Box> Set long time delay on logic box to MAX and set the "Short Time Delay" to the desired setting, "MIN", "INT", or "MAX".
2. Test Set> Set the "Phase Selector" to the desired phase and set the "Ground Fault" switch to "Defeat".
3. Test Set> Place the "Fault" switch in the "Test" position and adjust the "Variac" to a current that is 150% of the short time pick-up current. In order to perform this test, the short time pick-up switch on the logic box must be set to its maximum setting to prevent tripping. Once the "Variac" control is set, place the pick-up switch to the original setting. Place the "Fault" switch in the "Reset" position.

4. Test Set> Place the "Fault" switch in the "Test" position until the logic trips and the "Open" lamp lights. The "Trip Timer" will indicate the elapsed time. Compare this time with that in Chart 1B. Repeat for other phases or switch settings if desired.
5. Return "Variac" to "0" and place the "Fault" switch in the "Reset" position.

Chart 1B – Short Time Delay

Set Secondary Current	Min	.08-.17 Sec
to 150% of Chart 2B	Int	.20-.32 Sec
	Max	.35-.50 Sec

Chart 2B – Short Time Pick-up Currents

Amp Tap	Test Current	2	3	4	6	8	10
.5	2.50	5.00	7.50	10.0	15.0	20.0	25.0
.75	3.75	7.50	11.25	15.0	22.5	30.0	37.5
1.0	5.00	10.0	15.0	20.0	30.0	40.0	50.0

INSTANTANEOUS FUNCTION

PICK-UP TEST

1. Logic Box> Set long time delay switch to "MAX".
2. Test Set> Set the "Phase Selector" switch to the desired phase and set the "Ground Fault" switch to the "Defeat" position.
3. Test Set> Place the "Fault" switch in the "Test" position and slowly increase the "Variac" from "0" until the logic trips and the "Open" lamp lights. Observe the reading on the "Ammeter" at the moment the breaker trips and compare the reading to the value in Chart 2C. Return the "Variac" to "0" and place the "Fault" switch in the "Reset" position.
4. Test Set> Repeat for other phases or pick-up settings if desired.

INSTANTANEOUS DELAY

1. Logic Box> Set long time delay on logic box to MAX.
2. Test Set> Set the "Phase Selector" to the desired phase and set the "Ground Fault" switch to "Defeat".
3. Test Set> Place the "Fault" switch in the "Test" position and adjust the "Variac" to a current that is 150% of the instantaneous pick-up current. In order to perform this test, the instantaneous pick-up switch on the logic box must be set to its maximum setting to prevent tripping. Once the "Variac" control is set, place the pick-up switch to the original setting. Place the "Fault" switch in the "Reset" position.
4. Test Set> Place the "Fault" switch in the "Test" position until the logic trips and the "Open" lamp lights. The "Trip Timer" will indicate the elapsed time. Compare this time with that in Chart 1C. Repeat for other phases or switch settings if desired.
5. Return "Variac" to "0" and place the "Fault" switch in the "Reset" position.

Chart 1C – Instantaneous Delay

Set Secondary Current	No More Than
To 150% of Chart 2C	.06 Sec

Chart 2C – Instantaneous Pick-up Currents

Amp Tap	Test Current	4	5.2	6.4	7.6	8.8	11
.5	2.50	10.0	13.0	16.0	19.0	22.0	27.50
.75	3.75	15.0	19.5	24.0	28.5	33.0	41.25
1.0	5.00	20.0	26.0	32.0	38.0	44.0	55.00

GROUND FUNCTION

PICK-UP

1. Logic Box> Set long time delay switch to "MAX".
2. Test Set> Set the "Phase Selector" switch to the desired phase and set the "Ground Fault" switch to the "Test" position.
3. Test Set> Place the "Fault" switch in the "Test" position and slowly increase the "Variac" from "0" until the logic trips and the "Open" lamp lights. Observe the reading on the "Ammeter" at the moment the breaker trips and compare this to the value in Chart 2D. Return the "Variac" to "0" and place the "Fault" switch in the "Reset" position.
4. Test Set> Repeat for other phases or pick-up settings if desired.

GROUND DELAY

1. Logic Box> Set long time delay on logic box to MAX and set the "Ground Fault Time Delay" to the desired setting, "MIN", "INT", or "MAX".
2. Test Set> Set the "Phase Selector" to the desired phase and set the "Ground Fault" switch to "Test".
3. Test Set> Place the "Fault" switch in the "Test" position and adjust the "Variac" to a current that is 300% of the ground fault pick-up current. In order to perform this test, the ground fault pick-up switch on the logic box must be set to its maximum setting to prevent tripping. Once the "Variac" control is set, place the pick-up switch to the original setting. Place the "Fault" switch in the "Reset" position.
4. Test Set> Place the "Fault" switch in the "Test" position until the logic trips and the "Open" lamp lights. The "Trip Timer" will indicate the elapsed time. Compare this time with that in Chart 1D. Repeat for other phases or switch settings if desired.
5. Return "Variac" to "0" and place the "Fault" switch in the "Reset" position.

Chart 1D – Ground Delay

Set Secondary Current	Min	.08-.17 Sec
to 300% of Chart 2D.	Int	.20-.32 Sec
	Max	.35-.50 Sec

Chart 2D – Ground Pick-up Currents

Ground Burden	1	3	6	8	10	12
225	2.22	6.67	13.33	17.77	22.22	26.67
600		2.50	5.00	6.67	8.33	10.00
800		1.87	3.75	5.00	6.25	7.50
1600			1.87	2.50	3.12	3.75
3200				1.25	1.56	1.87
4000				1.00	1.25	1.50

Chart 1 – Time Delay Function

Long Time Delay	Set Secondary Current to 300% of Chart 2A	Min 8-12 Sec Int 20-30 Sec Max 60-90 Sec
Short Time Delay	Set Secondary Current to 150% of Chart 2B	Min .08-.17 Sec Int .20-.32 Sec Max .35-.50 Sec
Instantaneous Delay	Set Secondary Current to 150% of Chart 2C	No More Than .06 Sec
Ground Delay	Set Secondary Current to 300% of Chart 2D	Min .08-.17 Sec Int .20-.32 Sec Max .35-.50 Sec

Chart 2A – Long Time Pick-up Currents

Amp Tap	Test Current	.4	.52	.64	.76	.88	1.0
.5	2.50	1.00	1.30	1.60	1.90	2.20	2.50
.75	3.75	1.50	1.95	2.40	2.85	3.30	3.75
1.0	5.00	2.00	2.60	3.20	3.80	4.40	5.00

Chart 2B – Short Time Pick-up Currents

Amp Tap	Test Current	2	3	4	6	8	10
.5	2.50	5.0	7.50	10.0	15.0	20.0	25.0
.75	3.75	7.50	11.25	15.0	22.5	30.0	37.5
1.0	5.00	10.0	15.0	20.0	30.0	40.0	50.0

Chart 2C – Instantaneous Pick-up Currents

Amp Tap	Test Current	4	5.2	6.4	7.6	8.8	11
.5	2.50	10.0	13.0	16.0	19.0	22.0	27.50
.75	3.75	15.0	19.5	24.0	28.5	33.0	41.25
1.0	5.00	20.0	26.0	32.0	38.0	44.0	55.00

Chart 2D – Ground Pick-up Currents

Ground Burden	1	3	6	8	10	12
225	2.22	6.67	13.33	17.77	22.22	26.67
600		2.50	5.00	6.67	8.33	10.00
800		1.87	3.75	5.00	6.25	7.50
1600			1.87	2.50	3.12	3.75
3200				1.25	1.56	1.87
4000				1.00	1.25	1.50

*The test current values listed are secondary amperes. All pick up values may vary +/- 10%.

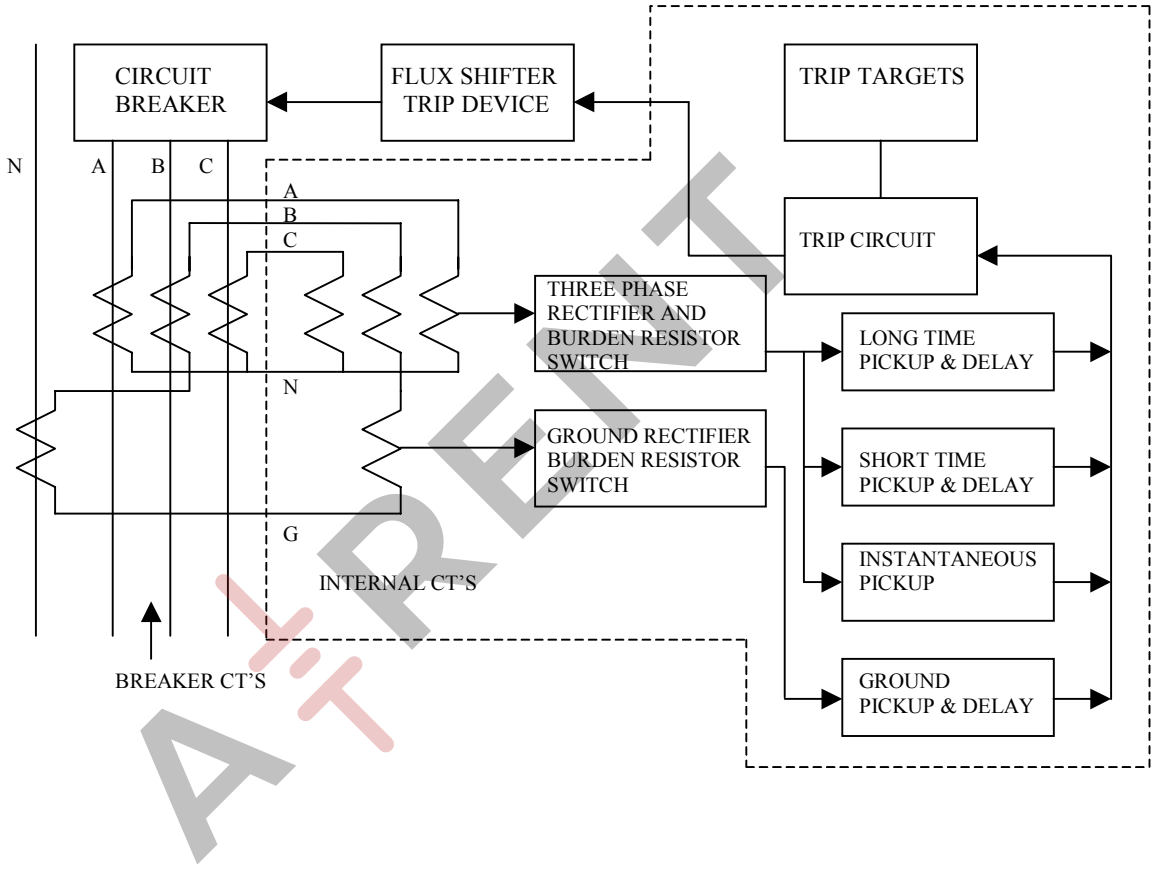
SAMPLE TEST CHART

LONG TIME FUNCTION: SWITCH SETTING _____AMP TAP _____ PICKUP CURRENT _____
DELAY SETTING _____ ELAPSED TIME A _____ B_____ C_____

SHORT TIME FUNCTION: SWITCH SETTING _____AMP TAP _____ PICKUP CURRENT _____
DELAY SETTING _____ ELAPSED TIME A _____ B _____ C _____ I Square T IN___or Out___

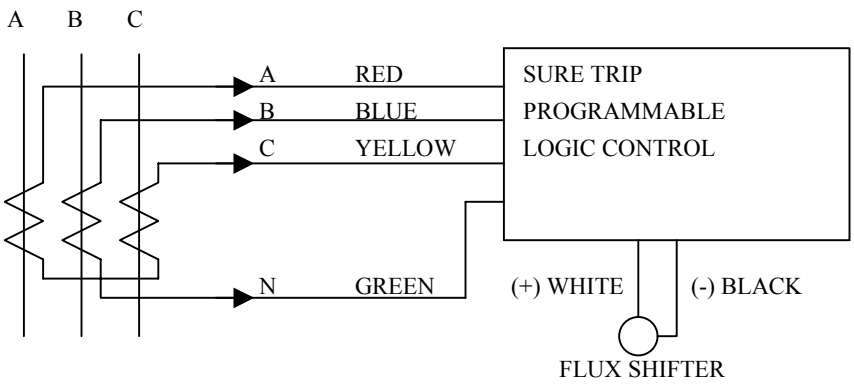
INSTANTANEOUS FUNCTION: SWITCH SETTING _____ AMP TAP _____ PICKUP CURRENT _____
ELAPSED TIME A _____ B _____ C _____

GROUND FAULT FUNCTION: PICKUP SWITCH SETTING _____ BURDEN SWITCH SETTING _____
PICKUP CURRENT _____ DELAY SETTING _____ ELAPSED TIME A _____ B _____ C _____



FUNCTION BLOCK DIAGRAM

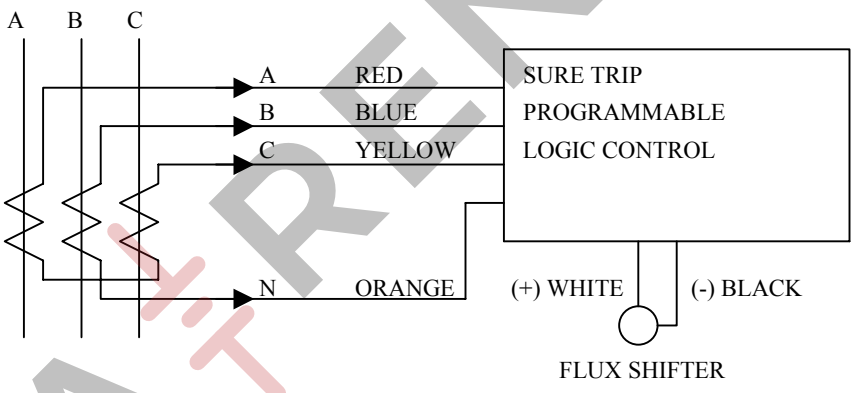
DRAWING 1



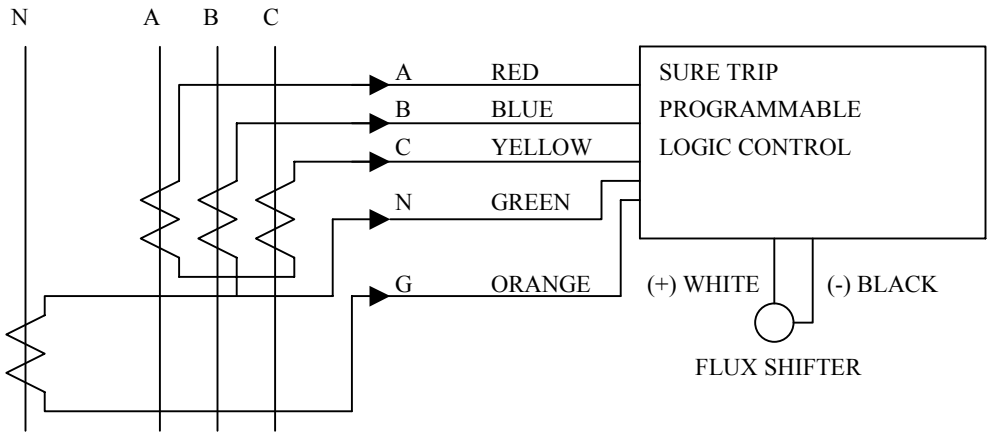
WIRING DIAGRAM FOR SYSTEMS WITHOUT
GROUND FAULT PROTECTION
DRAWING 3

TESTING GROUND FAULT SYSTEMS

Connect the green wire from the wiring harness(COMMON) to the CT's while testing all trip functions, except the ground fault. To test the ground fault function, disconnect the green wire and connect the orange wire and perform the test.



WIRING DIAGRAM FOR 3-WIRE SYSTEMS
WITH GROUND FAULT PROTECTION
DRAWING 4



WIRING DIAGRAM FOR 4-WIRE SYSTEMS
WITH GROUND FAULT PROTECTION
DRAWING 5

RMS-100

OEM REPLACEMENT TRIP UNIT

THE RMS-100 IS SPECIFICALLY DESIGNED AS A DIRECT REPLACEMENT TRIP UNIT WHICH ***UTILIZES THE EXISTING CURRENT SENSORS AND MAGNETIC FLUX SHIFTER.***

TRUE RMS CURRENT SENSING **PATENTED TECHNOLOGY**

MODELS AVAILABLE

RMS-100-1A	1 AMP PICKUP
RMS-100-2A	2 AMP PICKUP
RMS 85 LOGIC	5 AMP PICKUP

THE RMS 100 CAN BE CALIBRATED TO MEET OEM CURRENT TRANSFORMER OUTPUTS. STANDARD UNIT INCLUDES LONG TIME, SHORT TIME, INSTANTANEOUS, AND GROUND FAULT PROTECTION.

THE RMS-100 CAN REPLACE ALL THE TRIP UNITS LISTED BELOW AND MORE.

ABB-BBC POWERSHIELD SS1-SS6
SIEMENS-ALLIS STATIC TRIP 1
SIEMENS-ALLIS STATIC TRIP 2
SIEMENS-ALLIS LIMIT TRIP
MULTILIN FB-600
SYLVANIA
ITEKTOR
WESTINGHOUSE AMPTECTOR IA-IIA
WESTINGHOUSE DIGI-TRIP
FEDERAL PACIFIC SSI-SS6
FEDERAL PACIFIC HSSA1-HSSA6
FEDERAL PACIFIC USD
FEDERAL PACIFIC SSD

1 AMP SYSTEM CHART

Chart 3 – Time Delay Function

Long Time Delay	Set Secondary Current to 300% of Chart 3A	Min 8-12 Sec Int 20-30 Sec Max 60-90 Sec
Short Time Delay	Set Secondary Current to 150% of Chart 3B	Min .08-.17 Sec Int .20-.32 Sec Max .35-.50 Sec
Instantaneous Delay	Set Secondary Current to 150% of Chart 3C	No More Than .06 Sec
Ground Delay	Set Secondary Current to 300% of Chart 3D	Min .08-.17 Sec Int .20-.32 Sec Max .35-.50 Sec

Chart 3A – Long Time Pick-up Currents

Test Current	.4	.52	.64	.76	.88	1.0
1.00	.400	.520	.640	.760	.880	1.000

Chart 3B –Short Time Pick-up Currents

Test Current	2	3	4	6	8	10
1.00	2.00	3.00	4.00	6.00	8.00	10.00

Chart 3C – Instantaneous Pick-up Currents

Test Current	4	5.2	6.4	7.6	8.8	11
1.00	4.00	5.20	6.40	7.60	8.80	11.00

Chart 3D – Ground Pick-up Currents

Ground Burden	1	3	6	8	10	12
225	.444	1.334	2.666	3.554	4.444	5.334
600		.500	1.000	1.334	1.666	2.000
800		.374	.750	1.000	1.125	1.500
1600			.374	.500	.624	.750
3200				.250	.312	.374
4000				.200	.250	.300

The test current values listed are secondary amperes. All pick up values may vary +/- 10%.

SAMPLE TEST CHART

LONG TIME FUNCTION: SWITCH SETTING _____ PICKUP CURRENT _____
DELAY SETTING _____ ELAPSED TIME A _____ B_____ C_____

SHORT TIME FUNCTION: SWITCH SETTING _____ PICKUP CURRENT _____
DELAY SETTING _____ ELAPSED TIME A _____ B _____ C _____ I Square T IN___or Out___

INSTANTANEOUS FUNCTION: SWITCH SETTING _____ PICKUP CURRENT _____
ELAPSED TIME A _____ B _____ C _____

GROUND FAULT FUNCTION: PICKUP SWITCH SETTING _____ BURDEN SWITCH SETTING _____
PICKUP CURRENT _____ DELAY SETTING _____ ELAPSED TIME A _____ B _____ C _____