# TABLE OF CONTENTS

# LIST OF FIGURES

## Section 1

## Digitrip RMS Retrofit Kits, Rating Plugs, and Accessories For DB and DBL-25 Drawout Breakers

### 1-1. Digitrip RMS Retrofit Kits

The available Westinghouse Digitrip RMS Retrofit Kits and their associated style numbers for Westinghouse types DB and DBL-25 Drawout Power Circuit Breakers are listed in Figure 1-1. The Digitrip RMS Retrofit Kit styles are structured according to the Digitrip RMS/R Trip Unit and the specific overcurrent protective features provided.

The product line begins with the Digitrip RMS 500 Basic Retrofit Kit series. True RMS sensing, basic overcurrent protection, and self-testing features are provided as standard. The overcurrent protection provided is determined by the selected Long Time (L), Short Time (S), Instantaneous (I), & Ground Fault Time (G) Delay trip functions.

The balance of the Digitrip RMS 500, 600, 700, & 800 series Retrofit Kits listed add increasing levels of features to those of the RMS 500 Basic Retrofit Kits and to each other. The features include zone interlocking, digital alphanumeric displays, remote alarm signals, INCOM communications, and energy monitoring capability.

Additional information on the features and content of each Digitrip RMS Retrofit Kit is provided in the Sections 3 through 6 of this instruction leaflet.

### 1-2. Retrofit Kit Installation Requirements

The Digitrip RMS Retrofit Kits listed can be applied on DB and DBL-25 Drawout Power Circuit Breakers, provided the breakers are used on 50 or 60 hertz ac distribution systems. Retrofits for DB-25 fixed mounted, non-draw-out, breakers should be referred to Westinghouse for evaluation.

The design and content of the retrofit kit is based on the following clarifications, which must be addressed by the retrofit kit purchaser, prior to installation:

1. The maximum rated rating plug is included in the kit. One catalog PD6A06A060, 600 amp, 60 Hz rating plug is provided, which corresponds with the DB-25 breaker 600 amp maximum continuous current frame rating. If an alternate rating plug is required for the breaker retrofitted, it can be ordered separately. Figure 1-2 provides a complete listing of all rating plugs including those for 50 hertz application. Rating plugs must coordinate with the breaker sensor tap used. Together they determine the breaker $I_n$ (continuous current) rating.

Figure 1-1

Digitrip RMS Retrofit Kits for DB and DBL-25 Breakers

| Digitrip RMS Retrofit Kit Type & Description | Digitrip RMS Retrofit Kit Style Number | Digitrip RMS/R Trip Unit Provided in Retrofit Kit | |
|---|---|---|---|
| | | Functions | Catalog No. |
| RMS/R 500 Basic Kits<br><br>(Basic overcurrent protection only, zone interlocking functions not wired out) | 8188A30G37 | LI | RH51BLI |
| | 8188A30G38 | LS | RH53BLS |
| | 8188A30G39 | LSI | RH52BLSI |
| | 8188A30G40 | LIG | RH54BLIG |
| | 8188A30G41 | LSG | RH55BLSG |
| | 8188A30G42 | LSIG | RH56BLSIG |
| RMS/R 500 Zone Kits<br><br>(Basic overcurrent protection with zone interlocking functions wired out) | 8188A30G07 | LI | RH51BLI |
| | 8188A30G08 | LS | RH53BLS |
| | 8188A30G09 | LSI | RH52BLSI |
| | 8188A30G10 | LIG | RH54BLIG |
| | 8188A30G11 | LSG | RH55BLSG |
| | 8188A30G12 | LSIG | RH56BLSIG |
| RMS/R 600 Kits<br><br>(Zone interlocking and Remote Alarm Signals wired out, Alphanumeric Digital Display) | 8188A31G07 | LI | RH61BLI |
| | 8188A31G08 | LS | RH63BLS |
| | 8188A31G09 | LSI | RH62BLSI |
| | 8188A31G10 | LIG | RH64BLIG |
| | 8188A31G11 | LSG | RH65BLSG |
| | 8188A31G12 | LSIG | RH66BLSIG |
| RMS/R 700 Kits<br><br>(Zone interlocking, Remote Alarm & INCOM Communication Signals wired out) | 8188A32G07 | LI | RH71BLI |
| | 8188A32G08 | LS | RH73BLS |
| | 8188A32G09 | LSI | RH72BLSI |
| | 8188A32G10 | LIG | RH74BLIG |
| | 8188A32G11 | LSG | RH75BLSG |
| | 8188A32G12 | LSIG | RH76BLSIG |
| RMS/R 800 Kits<br><br>(Zone interlocking, Remote Alarm & INCOM Communication Signals wired out, Alhpa-numeric Digital Display) | 8188A33G07 | LI | RH81BLI |
| | 8188A33G08 | LS | RH83BLS |
| | 8188A33G09 | LSI | RH82BLSI |
| | 8188A33G10 | LIG | RH84BLIG |
| | 8188A33G11 | LSG | RH85BLSG |
| | 8188A33G12 | LSIG | RH86BLSIG |

2. Retrofit kits shown with Ground Fault (G) Protection assume a 3 phase 3 wire grounded system. If the retrofit is for a 4 wire grounded system, the customer must purchase the 4th sensor separately. Also, provisions must be made on the breaker to bring the 4th sensor wiring through the breaker secondary contacts. Secondary contacts and brackets, etc. are not included in the content of the kits.

3. Digitrip RMS 600, 700, and 800 Retrofit Kits require an external (customer supplied) 120 Vac source to power the information functions and the alphanumeric digital digital displays, as applicable, of the trip unit.

Figure 1-2

Digitrip Rating Plugs (50 and 60 Hertz) and Their Coordination with DB and DBL-25 Sensor Tap Connections

| Required Breaker Current Rating | Sensor Tap Rating Connected | 60 Hertz Rating Plug Catalog Number & In Rating | 50 Hertz Rating Plug Catalog Number & In Rating |
|---|---|---|---|
| 100 Amp | 200:5 | PR6A02A010 100 Amp | PR5A02A010 100 Amp |
| 200 Amp | 200:5 | PR6A02A020 200 Amp | PR5A02A020 200 Amp |
| 400 Amp | 400:5 | PR6A04A040 400 Amp | PR5A04A040 400 Amp |
| 600 Amp | 600:5 | PR6A06A060 600 Amp | PR5A06A060 600 Amp |

* Notes:

1. Sensor tap connections are based on style 8184A39H01 sensors.
2. Sensor tap rating connected must correspond with the rating plug shown.
3. Breaker current rating shown is adjustable down to 50% of the value listed with Digitrip RMS/R Long Delay Pickup Setting.
4. Rating plug PR6A06A060 is provided as standard in each kit. All other plugs listed may be purchased separately.

## 1-3. Digitrip RMS Retrofit Kit Accessories

Figure 1-3 provides a listing of optional accessories that are useful in the installation, maintenance, and operation of your DB-25 breaker equipped with a Digitrip RMS Retrofit Kit.

**Figure 1-3**

**Digitrip RMS Retrofit Kit Accessories**

| Accessory Description | Accessory Style or Catalog Number | Function |
|---|---|---|
| Auxiliary Power Module (APM) | PRTAAPM | Powers Digitrip RMS Trip Unit for Testing |
| Amptector Test Kit | 140D481G02RR or G03 | Tests Digitrip RMS Trip Units. Requires Adapter Harness. |
| Amptector Test Kit Adapter Harness | | Tests Digitrip RMS Trip Units with Amptector Test Kit. |
| Zone Interlock Shorting Plug | 6502C83G01 | Plugs into RMS/R Trip Unit Plug J2. Shorts Out GIN to Gout and SIN to SOUT During Trip Unit Testing. |
| Lithium Battery 3.0 Volt | Varta Batteries, Inc.<br>Model CR 1/3N<br>150 Clarabrook Road<br>Elmsford, NY 10523<br><br>Duracell<br>Model DL 1/3N<br>South Braodway<br>Tangtown, NY 10591<br>(914)-591-7000<br><br>Union Carbide Corp.<br>Battery Products Div.<br>Model 2L-76BP<br>Eveready<br>39 Old Ridgebury Road<br>Danbury, CT 06817-0001<br>(203)-794-7548 | Powers Digitrip LED Mode of Trip Indicators (Back-up Power). |

## Section 2

## The Digitrip RMS Trip System

### 2-1. Digitrip RMS Overcurrent Protection

The Digitrip RMS Retrofit Kit styles covered by this Instruction Leaflet are designed to replace the existing electromechanical trip system employed on the DB or DBL-25 breaker selected for retrofitting. Figure 2-1 shows a typical DB-25 Breaker equipped with a Digitrip RMS 800 Retrofit Kit. The RMS 800 Retrofit Kit was selected to show the maximum information possible to aid in the description of all model kits.

All Digitrip RMS Retrofit Kits provide basic overcurrent protection, which includes a selected combination of Long Time (L), Short Time (S), Instantaneous (I), & Ground Fault Time (G) Delay trip functions. Five major components comprise the Digitrip RMS Trip System; the Current Sensors, Auxiliary CT Module, Digitrip Trip Unit, Rating Plug, and the Direct Trip Actuator (DTA). These components are interconnected by use of the overcurrent wiring harness and various extension and umbilical harnesses to make up the Digitrip RMS Trip System. Breaker interface diagrams for Digitrip RMS 500 through 800 are provided in Sections 3 through 6. These diagrams show the major Digitrip RMS components and their interconnections.

### 2-2. Current Sensors (& Overcurrent Wiring Harness)

igure 2-2 shows three multi-tapped current sensors (one per phase), located at the rear of the breaker, placed over the lower stud assemblies. The sensors pass intelligence to the Auxiliary CT Module and the trip unit on the primary current level passing through the breaker. All the energy required to power the Digitrip RMS Trip System is produced by the current sensors.

The current sensors are connected to a terminal block strip on the Auxilary CT Module by the overcurrent wiring harness. The current sensor tap ratio connected, in concert with the rating plug, determines the $I_n$ (continuous current) rating of the breaker. At rated primary current, the current sensors provide 5 ampere nominal current inputs to the Auxiliary CT Module.

### 2-3. Auxiliary CT Module (& CT Extension Harness)

The Auxiliary CT Module, Figure 2-1, mounts on steel mounting angles at the the front of the breaker. It encloses three auxiliary phase current transformers, which reduce the 5 amp nominal inputs from the current sensors to the 100 milliampere level required for the Digitrip RMS/R Trip Unit electronics. When ground fault (G) protection is selected, a ground auxiliary current transformer is provided, which reduces the 5 amp nominal sensor input to the 200 milliampere level.

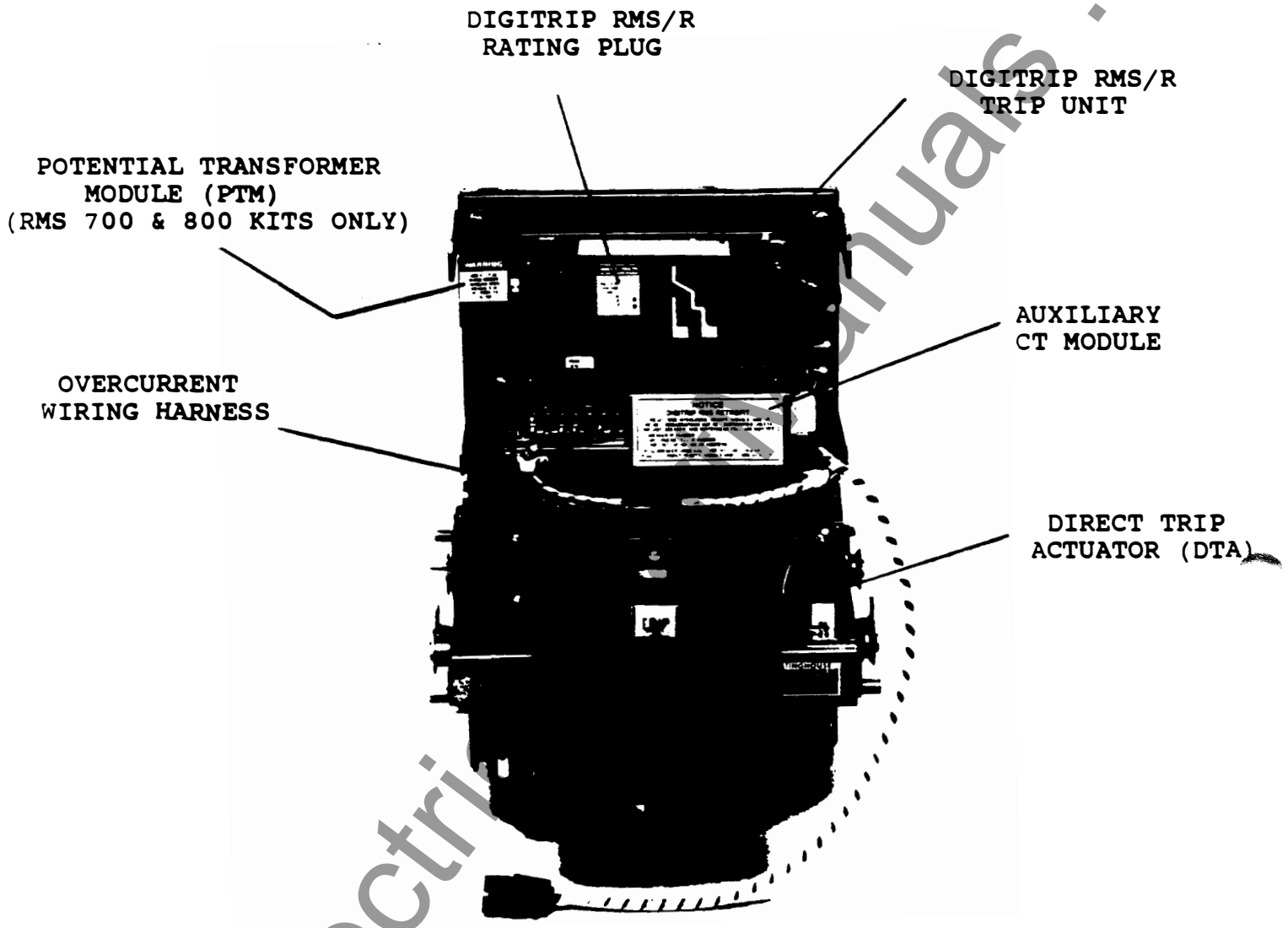



**Figure 2-1**

**DB-25 Breaker With Digitrip RMS 800 Retrofit Kit
(Front View)**

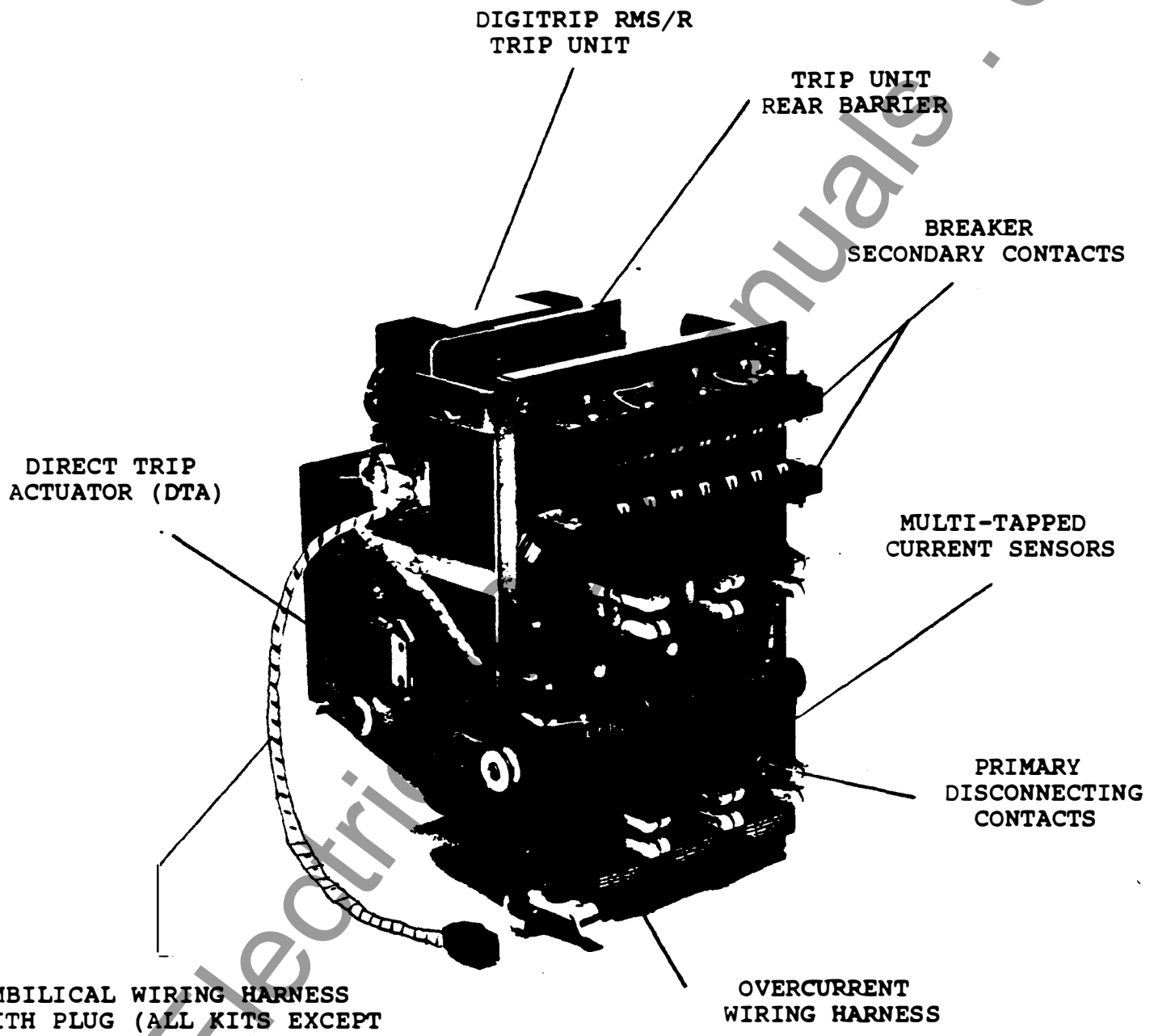



**Figure 2-2**

**DB-25 Breaker With Digitrip RMS 800 Retrofit Kit (Rear View)**

A 7 point terminal block strip is mounted on the front of the module. Terminals A through G terminate the inputs from the current sensors via the overcurrent wiring harness. Terminals OP and ON connect the trip signal outputs through the overcurrent wiring harness to the Direct Trip Actuator (DTA). A 12 point female CT plug-in block is mounted on the right hand side of the module, which receives the male plug of the CT extension harness. The CT extension harness also has a 10 pin black plug, which plugs into the trip unit to connect the auxiliary CT inputs to the trip unit and receive the trip unit trip signal outputs.

## 2-4. Digitrip RMS/R Trip Unit (& Power Relay Module, ATR)

The Digitrip RMS/R (RMS/Retrofit) Trip Unit, Figure 2-1, is designed to permit flexibility in retrofit applications. It is a physically repackaged version of the original Digitrip RMS Trip Unit. The RMS and RMS/R Trip Units have the same features and options and have identical characteristic curves, adjustments, and electrical performance.

The Digitrip RMS/R Trip Unit is a microprocessor based protective device that provides true RMS sensing means for proper correlation with thermal characteristics on conductors and equipment. Digitrip RMS/R Trip Units are available in four models, RMS/R 500, 600, 700 & 800. These models are available in horizontal or vertical orientations. RMS/R horizontal trip units are used on DB and DBL-25 breakers.

The trip unit includes a female type receptacle, provided to accept a rating plug, which (in concert with the current sensors) determines the $I_n$ (continuous current) rating of the breaker. Adjustable current protective settings are provided for the Long Time (L), Short Time (S), Instantaneous (I), & Ground Fault Time (G) Delay trip functions selected. Short Time (S) and Ground Fault (G) Delays are equipped with an adjustable setting for a flat or an $I^2t$ response. The adjustable settings are step-type, expressed in terms of the $I_n$ (continuous current) rating of the breaker. LEDs provide mode of trip indications for the L, S, I, & G trip functions. Digitrip RMS/R Trip Units are equipped with multi-pin disconnect plug receptacles, which permit quick connections to the CT extension harness and (when supplied) the umbilical harness.

The Power Relay Module (ATR) is provided in Digitrip RMS/R trip unit models 600 through 800 only. The ATR provides hard contact closures for remote indication of the following trip unit functions:

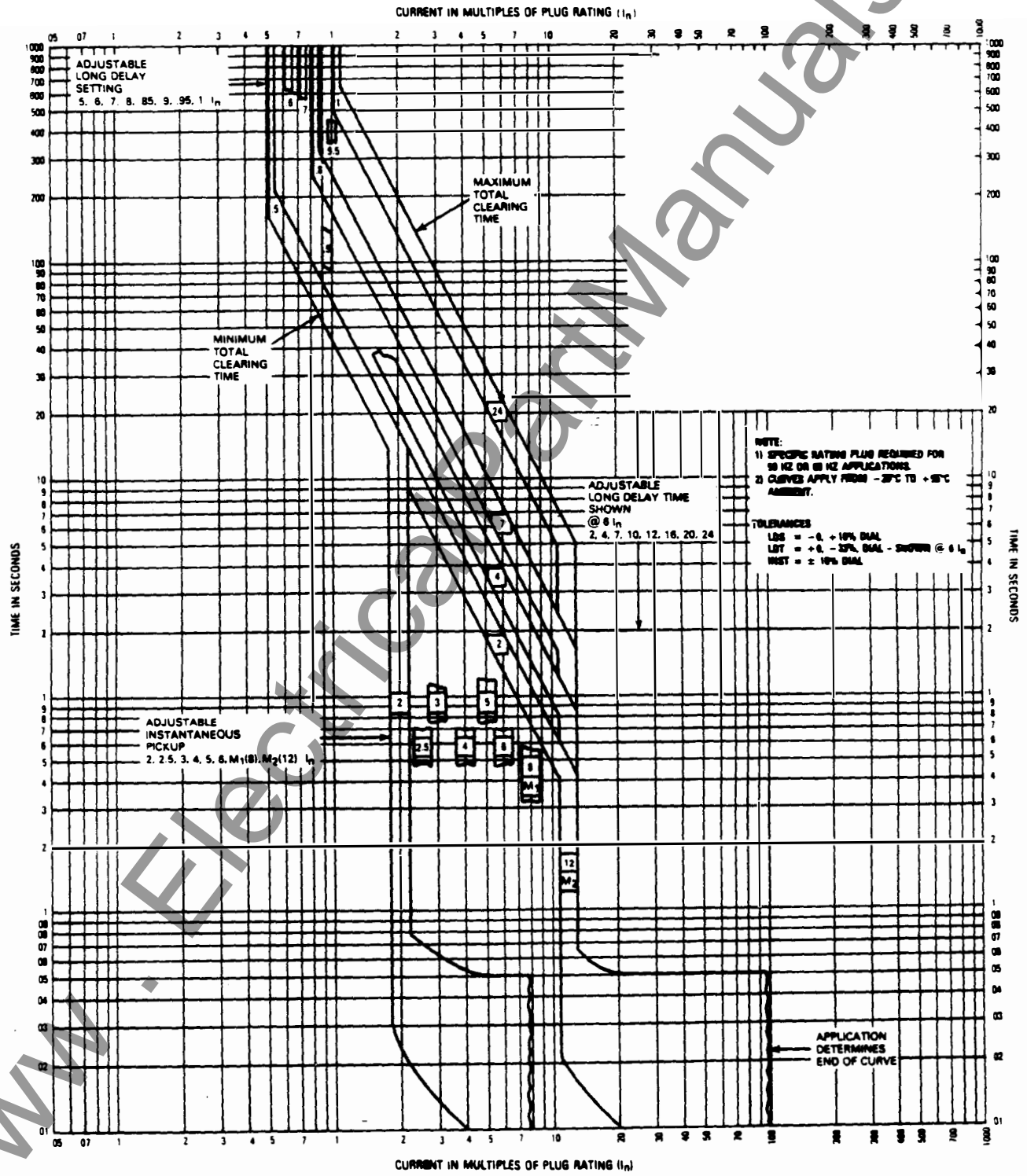
* High Load (HL) Alarm: The HL contact closes when the current passing through the breaker exceeds 85% of the trip unit long delay pickup setting continuously for more than 40 seconds.
* Long Delay (LD) Trip
* Short Circuit (SC) Trip
* Ground Fault (GF) Trip functions
* INCOM Remote Close (CC1 & CC2) Contact (RMS/R 700 and 800)

Figure 2-3

Digitrip RMS/R Long Time/Instantaneous Time-Current Curve

DIGITRIP RMS/R 500/600/700/800

Typical Time-Current Characteristic Curve (LI)
for Retrofit Breakers.

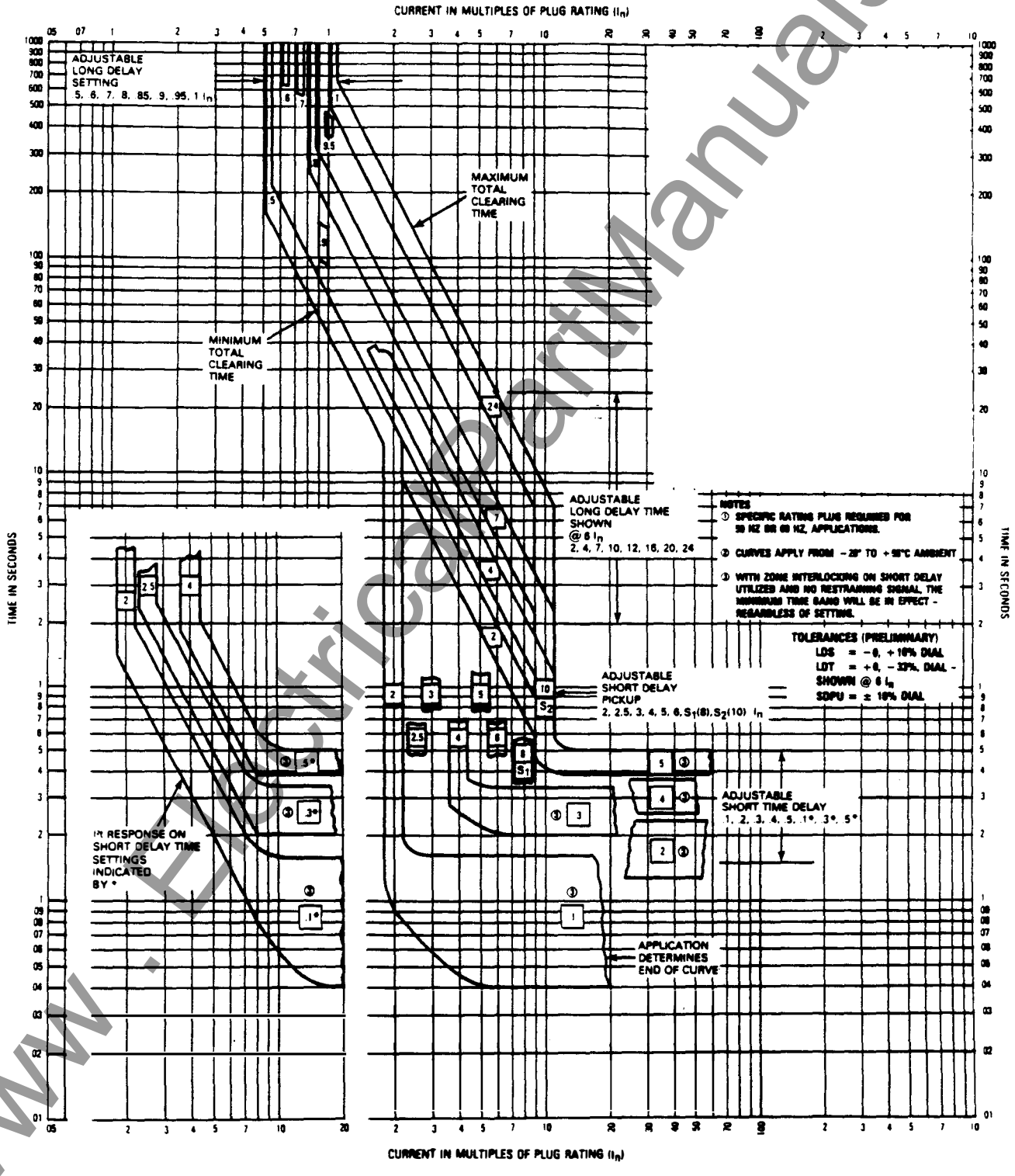


## Figure 2-4

## Digitrip RMS/R Long Time/Short Time Time-Current Curve

DIGITRIP RMS/R 500/600/700/800

Typical Time-Current Characteristic Curve (LS)
for Retrofit Breakers.

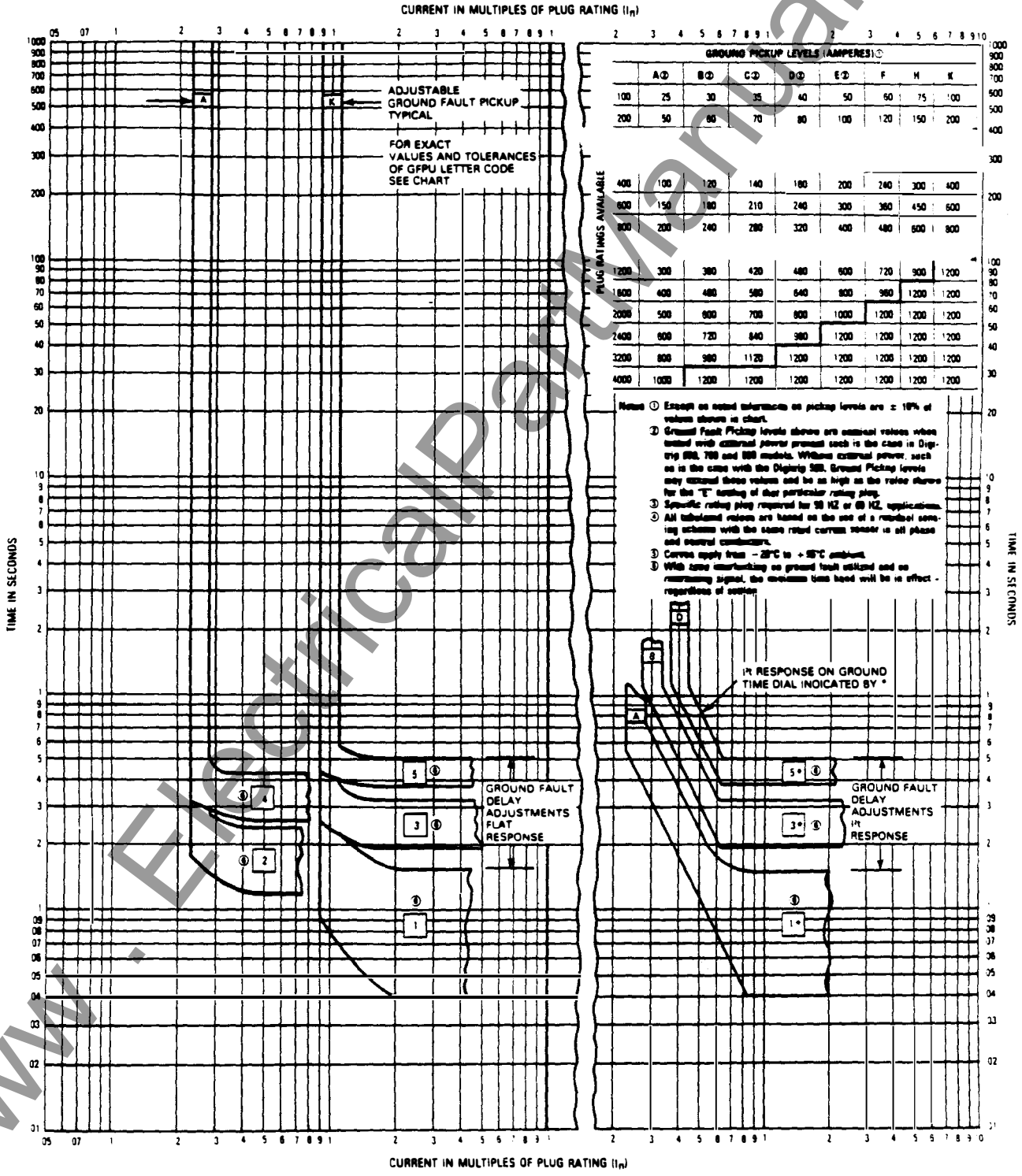


## Figure 2-5

## Digitrip RMS/R Ground Fault Protection Time-Current Curve

### DIGITRIP RMS/R 500/600/700/800

### Typical Time-Current Characteristic Curve (G) for Retrofit Breakers.




| | A | B | C | D | E | F | H | K |
|---|---|---|---|---|---|---|---|---|
| 100 | 25 | 30 | 35 | 40 | 50 | 60 | 75 | 100 |
| 200 | 50 | 60 | 70 | 80 | 100 | 120 | 150 | 200 |
| 400 | 100 | 120 | 140 | 160 | 200 | 240 | 300 | 400 |
| 600 | 150 | 180 | 210 | 240 | 300 | 360 | 450 | 600 |
| 800 | 200 | 240 | 280 | 320 | 400 | 480 | 600 | 800 |
| 1200 | 300 | 360 | 420 | 480 | 600 | 720 | 900 | 1200 |
| 1600 | 400 | 480 | 560 | 640 | 800 | 960 | 1200 | 1200 |
| 2000 | 500 | 600 | 700 | 800 | 1000 | 1200 | 1200 | 1200 |
| 2400 | 600 | 720 | 840 | 960 | 1200 | 1200 | 1200 | 1200 |
| 3200 | 800 | 960 | 1120 | 1200 | 1200 | 1200 | 1200 | 1200 |
| 4000 | 1000 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 |

Notes ① Except as noted tolerances on pickup levels are ± 10% of values shown in chart.
② Ground Fault Pickup levels above are nominal values when tested with external power present such is the case in Digitrip RMS, 700 and 800 models. Without external power, such as is the case with the Digitrip 500, Ground Picking levels may exceed these values and be as high as the value shown for the "E" setting of that particular rating plug.
③ Specific rating plug required for 50 HZ or 60 HZ, applications.
④ All tabulated values are based on the use of a residual sensing scheme with the same rated current sensor in all phase and neutral conductors.
⑤ Curves apply from – 20°C to + 55°C ambient.
⑥ With zone interlocking on ground fault utilized and no restraining signal, the minimum time band will be in effect - regardless of setting.

All ATR contacts are rated 1 ampere at 120 Vac or 1 amperes at 28 Vdc. These contacts are generally used for lighting indicating lights or picking up slave relays local to or remote from the breaker/switchgear. A bridge rectifier circuit in the ATR serves to power up (as applicable) the trip unit alphanumeric display and the INCOM communications logic, when a 120 Vac source is supplied to ATR terminals AC120 and ACCOM.

Digitrip RMS/R Trip Units are equipped with a receptacle to receive the Auxiliary Power Module (APM). The APM is used to supply power to the trip unit self-test system during circuit breaker testing. Adjustable test settings are provided which enable the unit to be tested with or without tripping the breaker.

Figures 2-3 though 2-5 provide the published Digitrip RMS Characteristic Curves for retrofit breakers. Also provided are the available trip unit settings for all trip functions.

## 2-5. Digitrip RMS Direct Trip Actuator (DTA, & Auxiliary Switch Kit)

The Digitrip RMS Direct Trip Actuator (DTA), Figures 2-2 and 2-6, receives an electrical trip pulse from the trip unit via the Auxiliary CT Module and provides the mechanical trip force to trip the breaker.

The DTA is made up of a permanent magnet, a disc held by the magnet, a rod acted on by a spring, a lever for tripping the breaker, and a reset arm assembly for mechanically resetting the actuator. The magnet cannot pull and reset the disc against the force of the spring acting on the rod, but it can overcome the spring force when the disc is in contact with the magnet pole piece.

A tripping pulse from the trip unit counteracts the effect of the permanent magnet, allowing the spring to separate to separate the disc from the magnetic pole piece and to actuate the trip shaft lever. The trip shaft strikes the breaker trip bar and trips the breaker. As the breaker opens, the breaker crossbar strikes the DTA reset arm, which moves the disc to close the air gap between it and the permanent magnet. The DTA is reset when the disc is held in contact against the magnet, against the spring force. If the DTA does not reset properly, the trip lever will hold the breaker in the trip free condition and the breaker will not be able to close.

RMS 700 & 800 Retrofit Kits include a DTA Auxiliary Switch Kit, not shown, which mounts on the DTA. The auxiliary switch kit consists of a microswitch with one normally closed (b) and one normally open (a) contact. The normally open contact is used to provide the trip unit with information on the breaker position, i.e. open or closed. This status information is passed on through the INCOM network.

Figure 2-6

Direct Trip Actuator (DTA) Interface With Breaker

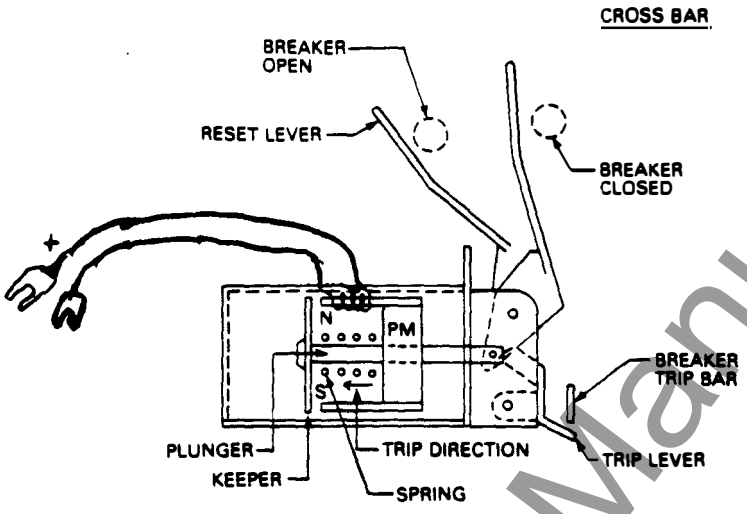
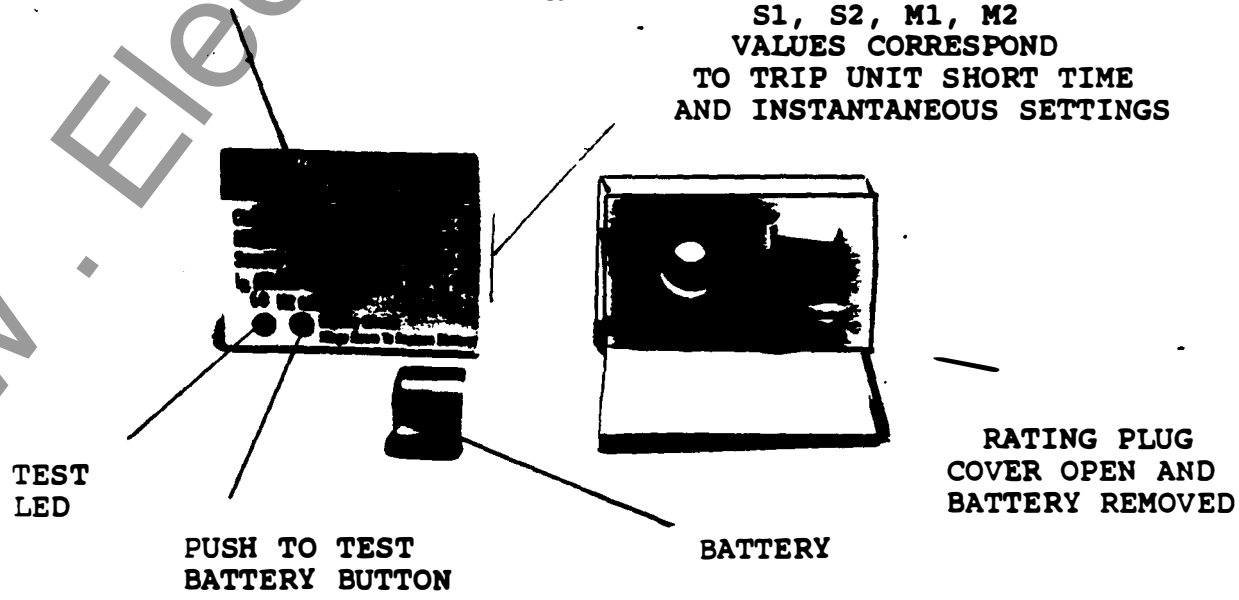



Figure 2-7

Typical Digitrip RMS/R Rating Plug With Battery

CATALOG LEGEND:

| | | |
|---|---|---|
| P | - | PLUG |
| R | - | RETROFIT |
| 6 | - | 60 HERTZ |
| A | - | AFTERMARKET |
| 40 | - | 4000 AMP SENSOR RATING |
| A | - | RATING PLUG SERIES |
| 400 | - | 4000 AMP PLUG $I_n$ |



## 2-6. Digitrip RMS/R Rating Plug and Battery

The Digitrip RMS/R Rating Plug, Figure 2-7, plugs into the Digitrip RMS/R Trip Unit to determine the breaker $I_n$ (continuous current) rating. The rating plug must be matched to the installed current sensor ratio and the distribution system frequency, i.e. 50 or 60 hertz. Each rating plug has fixed $S_1$ (8) and $S_2$ (10) values, which correspond to the trip unit Short Delay Pickup settings and $M_1$ (8) and $M_2$ (12) values, which correspond to the trip unit Instantaneous Pickup settings.

The rating plug is equipped with a long-life 3.0 Volt lithium type battery. This back-up battery is not required for the basic Digitrip RMS/R overcurrent protective circuit. It is used to maintain the trip unit mode of trip indication LEDs following a breaker tripping operation, when no external 120 Vac control power source (through the ATR) to the trip unit is applied. A new battery will maintain the mode of trip LED for approximately 60 hours when no external 120 Vac source is applied to the trip unit. The battery is replaceable from the front, without having to remove the rating plug from the trip unit. Replacement battery types are listed under the Accessories section of this instruction leaflet.

If a rating plug is removed when the breaker is in the closed position, the breaker may trip. Therefore, the rating plug must be securely installed, with its screw tightened into the trip unit and trip unit box.

## 2-7. Umbilical Wiring Harness With Plug

The umbilical wiring harness with plug, Figure 2-2, is provided in all retrofit kits, except the Basic RMS 500 series. The umbilical wiring harness has multi-pin disconnect plugs that plug into the trip unit to extract zone interlocking, remote alarm, and INCOM communications signals, as applicable, from the trip unit and to connect the 120 Vac power required on RMS 600, 700, and 800 kits. The umbilical harness also has a large 20 pin plug that plugs into the cell plug, wiring harness, and terminal block assembly, which is mounted in the switchgear cell.

## 2-8. Potential Transformer Module (PTM)

For RMS 700 and 800 kits, a Potential Transformer Module (PTM), Figure 2-1, is mounted on an insulating barrier, behind the trip unit and on top of the Auxiliary CT Module. The PTM passes on circuit breaker primary voltage information to the trip unit for use in obtaining INCOM energy monitoring data. Three #16 AWG leads are provided for the PTM primary connection to the breaker. The PTM secondary terminates to a 4 pin black male plug (PT1) to permit connection to the trip unit via the 4 pin female plug provided on the umbilical wiring harness.

CAUTION

THE PTM PRIMARY DISCONNECT PLUG MUST BE DISCONNECTED WHEN DIELECTRIC TESTING OF THE BREAKER/SWITCHGEAR ASSEMBLY IS PERFORMED OR THE TRIP UNIT MAY BE DAMAGED. DO NOT DISCONNECT THE PTM PLUG WHEN THE BREAKER IS ENERGIIZED OR IN THE CONNECTED POSITION. MOVE THE BREAKER TO THE TEST POSITION BEFORE PULLING THE PTM PLUG.

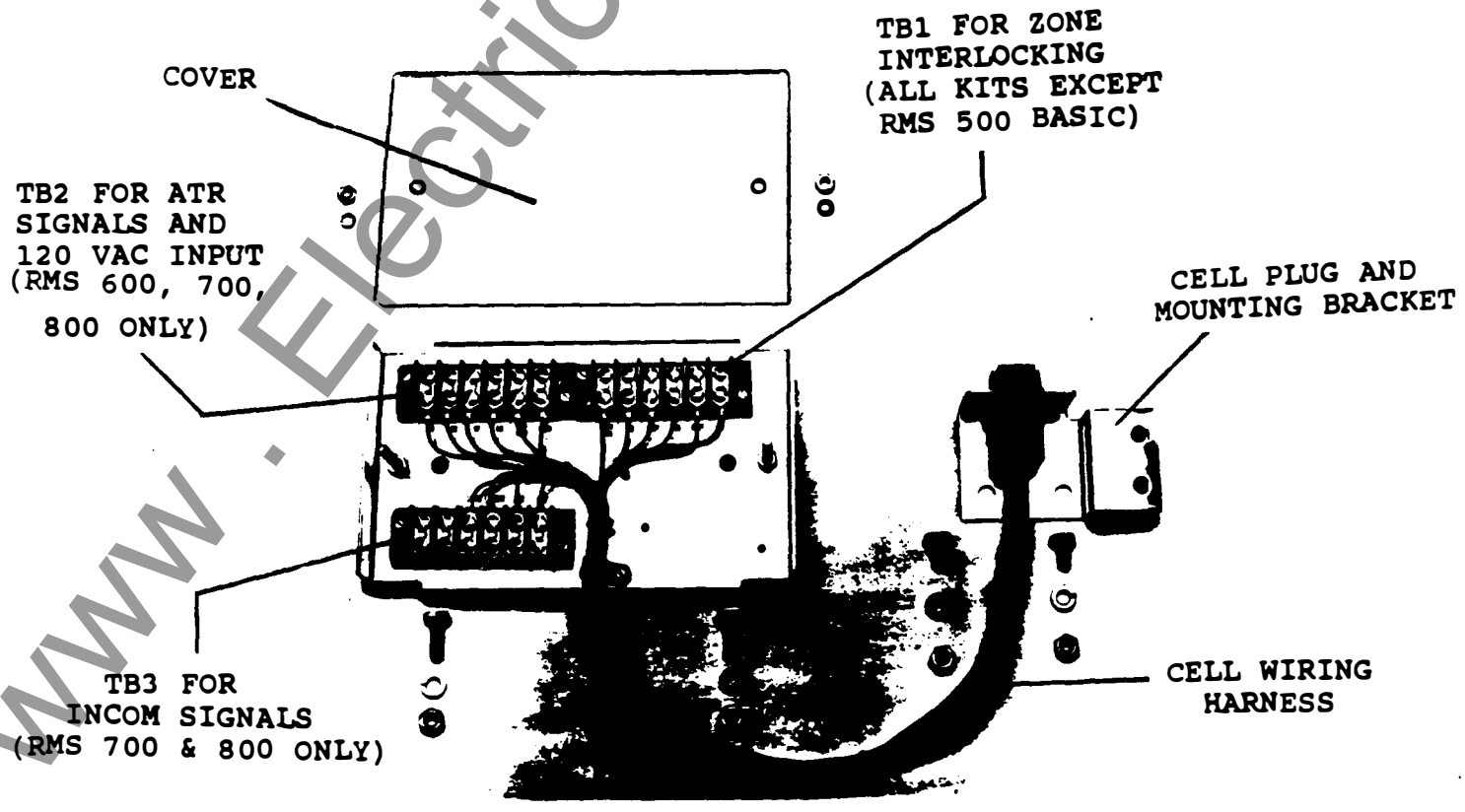
## 2-9. Cell Plug, Wiring Harness, and Terminal Block Assembly

The cell plug, wiring harness, and terminal block assembly, Figure 2-8, is provided on all retrofit kits, except the Basic RMS 500. Its function is to extract the zone interlocking, remote alarm, and communications signals from the breaker by connection to the umbilical wiring harness and provide terminations for external customer connections. Use of the assembly reduces the time required for retrofit. It eliminates the need to completely rewire the secondary contacts on the circuit breaker and in the switchgear to accomodate the added Digitrip RMS signals.

The assembly mounts in the breaker compartment of the switchgear on the right hand side sheet. The cell plug receives the breaker umbilical plug, providing a disconnecting means of extracting the signals from the breaker. A wiring harness brings the signals to terminal blocks for customer external connections in the switchgear. Depending on the retrofit kit selected, up to 3 terminal blocks (TB1, TB2, and TB3) are provided. Space also exists for the field addition of a fourth terminal block, if required.

Figure 2-8

Cell Plug, Wiring Harness, and Terminal Block Assembly



## Section 3

## Digitrip RMS 500 Basic Retrofit Kits (Without Zone Interlocking)

### 3-1. Digitrip RMS 500 Basic Retrofit Kit Selection & Content

The Digitrip RMS 500 Basic Retrofit Kit series provides basic overcurrent protection only. The available retrofit kit styles are shown in Figure 1-1, listed with the applicable Digitrip RMS/R 500 Trip Unit overcurrent trip functions, i.e. Long Time (L), Short Time (S), Instantaneous (I), & Ground Fault Time (G) Delays. Select the retrofit kit style to provide the required overcurrent trip functions of the DB-25 breaker to be retrofitted.

The complete Digitrip RMS 500 Basic Retrofit Kit bill of material is listed in Figure 3-1. All retrofit kit components are mounted on the breaker. Therefore, no switchgear cell modifications or wiring are required. Zone interlocking signals from the trip unit are not wired out from the breaker. Rather, they are shorted out with the Zone Interlock Shorting Plug (Plug J2, shown in Figure 3-2). Refer to Figure 3-2 for the retrofit kit wiring connections on the breaker.

### 3-2. Digitrip RMS 500 Basic Retrofit Kit Features

The Digitrip RMS/R 500 Trip Unit has the following features available for customer use, when applied in the Digitrip RMS 500 Basic Retrofit Kit:

1. Basic (L,S,I,G) overcurrent protection, as selected.
2. True RMS Sensing.
3. Integral Trip Unit Testing.
4. Unit Status Indicator.
5. Local Mode of Trip Indicators.
6. Selectable $I^2t$ on Short Time and Ground Fault Time Delays when those options are selected.

The trip unit also includes provisions to accept the required rating plug. The rating plug is equipped with a battery to power the local mode of trip indicators.

Figure 3-1
Digitrip RMS 500 Basic Retrofit Kits
Bill of Material for DB & DBL-25 Breakers

| Qty | Description | Style |
|---|---|---|
| 1 | Instruction Leaflet Digitrip RMS DB & DBL-25 | IL 33-855-2 |
| 1 | Digitrip RMS/R 500 Trip Unit | Figure 1-1 |
| 1 | RMS/R Rating Plug (600 Amp) | PR6A06A060 |
| 3 | Current Sensors (600/500/400/300/200:5) | 8184A39H01 |
| 1 | Auxiliary CT Module (With Ground G02) | 6502C78G01 |
| 1 | CT Module Extension Harness | 6502C84G01 |
| 1 | Zone Interlock Shorting Plug | 6502C83G01 |
| 1 | Direct Trip Actuator (DTA), DB-25 | 692C704G03 |
| 1 | DB-25 Parts Kit | 8188A36G02 |
| | (Style 8188A36G02 includes parts kit 6478C49G01), Including | |
| 3 | Copper Connector Plates | |
| 6 | Hex Bolt (0.50-13 X 3.0) — Mounts copper connector plates to breaker. | |
| 6 | Lock Washer (0.50) | |
| 6 | Flat Washer (0.50) | |
| 6 | Hex Nut (0.50-13) | |
| 1 | Set (LH & RH) Trip Unit Assembly Mounting Brackets | |
| 2 | Hex Bolt (0.50-13 X 1.5) | |
| 2 | Lock Washer (0.50) — Mounts "T-Shaped" trip unit assembly mounting brackets to breaker frame. | |
| 2 | Flat Washer (0.50) | |
| 2 | Hex Nut (0.50-13) | |
| 2 | Hex Bolt (0.375-16 X 1.5) | |
| 2 | Lock Washer (0.375) | |
| 2 | Flat Washer (0.375) | |
| 2 | Hex Nut (0.375-16) | |
| 1 | Sems Screw (0.25-20 X 0.50) — Mounts DTA to breaker platform. | |
| 1 | Screw (0.190-32 X 0.75) | |
| 1 | Lock Washer (0.190) | |
| 1 | Flat Washer (0.190) | |
| 1 | Hex Nut (0.190-32) — (Tubular Spacer mounts on breaker crossbar) | |
| 1 | DTA Rear Angle Bracket | |
| 1 | Tubular Spacer, Brass | |
| 1 | Set of Trip Unit Assembly Mounting Harware, Including: | |
| 2 | Screws (0.190-32 X 4.0) — Mounts trip unit to top of auxiliary CT module. | |
| 2 | Lock Washer (0.190) | |
| 2 | Flat Washer (0.190) | |
| 2 | Tubular Spacers (0.70 Long) | |
| 2 | Trip Unit Mounting Clips (LH & RH) | |
| 4 | Screws (0.190-32 X 0.625) — Mounts LH and RH trip unit mounting clips to sides of auxiliary CT module. | |
| 4 | Lock Washer (0.190) | |
| 4 | Flat Washer (0.190) | |
| 1 | Trip Unit Rear Barrier (Glass Polyester) | |
| 2 | Screws (0.190-32 X 0.625) — Mounts trip unit rear barrier to back of auxiliary CT module. | |
| 2 | Lock Washer (0.190) | |
| 2 | Flat Washer (0.190) | |
| 2 | Sems Screw (0.25-20 X 0.50) — Mounts trip unit assembly to "T-shaped" brackets. | |
| 1 | Overcurrent Wiring Harness | |
| 1 | Rubber Grommet (Slotted) | |
| 2 | Amp Splice Terminals — Terminals splice DTA leads to overcurrent harness. | |
| 2 | Amp Splice Terminal Inserts | |
| 3 | Nylon Wire Clamp (0.375 ID) | |
| 3 | Screw (0.164-32 X 0.50) — Secures overcurrent wiring harness and PTM leads along its length | |
| 3 | Lock Washer (0.164) | |
| 3 | Flat Washer (0.164) | |
| 3 | Hex Nut (0.164-32) | |
| 2 | Nylon Wire Clamp (0.375 ID) — Secures umbilical harness to auxiliary CT module. | |
| 2 | Thread Cutting Screws (0.138-32) | |
| 5 | Nylon Wire Ties — For dressing breaker and cell harnesses. | |
| 2 | Stick-on Nylon Wire Clamp | |
| 1 | Label, Digitrip RMS Retrofit 8187A63H01 | |

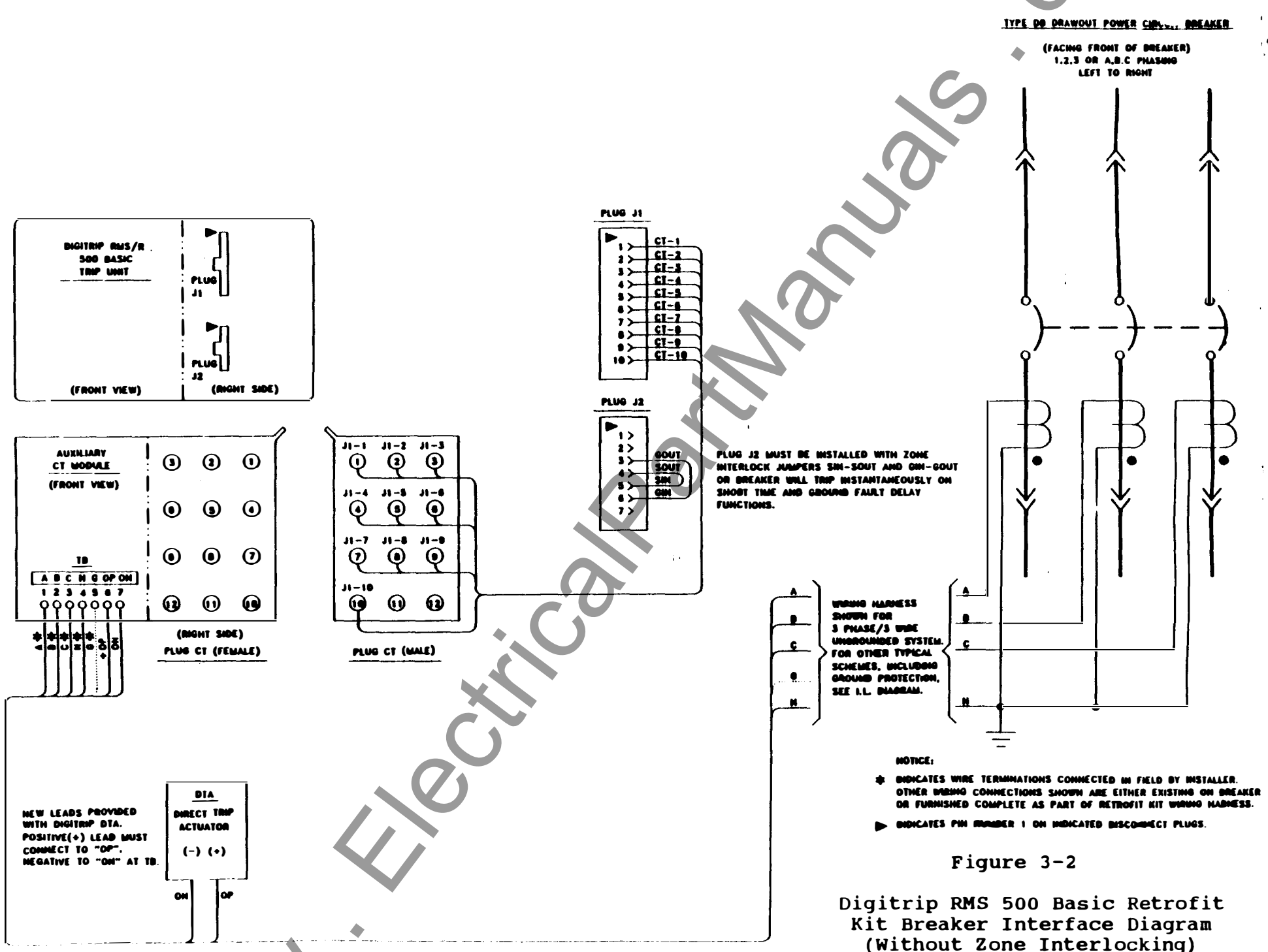



Figure 3-2

Digitrip RMS 500 Basic Retrofit Kit Breaker Interface Diagram (Without Zone Interlocking)

## Section 4

## Digitrip RMS 500 Retrofit Kits (With Zone Interlocking)

### 4-1. Digitrip RMS 500 Retrofit Kit (With Zone Interlocking) Selection & Content

The Digitrip RMS 500 Retrofit Kit series equipped with zone interlocking are shown in Figure 1-1. The applicable Digitrip RMS 500 Trip Unit overcurrent trip functions, i.e. Long Time (L), Short Time (S), Instantaneous (I), & Ground Fault Time (G) Delays are listed. Select the retrofit kit style to provide the required overcurrent trip functions of the DB-25 breaker to be retrofitted.

The complete Digitrip RMS 500 Retrofit Kit bill of material is listed in Figure 4-1. Zone interlocking signals are extracted the unit trip unit by the umbilical wiring harness with plug. The umbilical wiring harness includes a 20 pin plug, which connects to the cell plug, wiring harness, and terminal block assembly. All retrofit kit components are mounted on the breaker, except the cell plug, wiring harness, and terminal block assembly, which is mounted in the switchgear cell. Figures 4-2 and 4-3 provide the retrofit kit wiring connections on the breaker and the switchgear cell.

### 4-2. Digitrip RMS 500 Retrofit Kit (With Zone Interlocking) Features

The Digitrip RMS/R 500 Trip Unit has the following features available for customer use, when applied in the Digitrip RMS 500 Basic Retrofit Kit:

1. Basic (L,S,I,G) overcurrent protection, as selected.
2. True RMS Sensing.
3. Integral Trip Unit Testing.
4. Unit Status Indicator.
5. Local Mode of Trip Indicators.
6. Selectable $I^2t$ on Short Time and Ground Fault Time Delays when those options are selected.
7. Zone interlock capabilities of the breaker Short Time and Ground Fault Delay functions, when those options are selected.

The trip unit also includes provisions to accept the required rating plug. The rating plug is equipped with a battery to power the local mode of trip indicators.

Figure 4-1
Digitrip RMS 500 Retrofit Kits (with Zone Interlocking)
Bill of Material for DB & DBL-25 Breakers

| Qty | Description | Style |
|---|---|---|
| 1 | Instruction Leaflet Digitrip RMS DB & DBL-25 | IL 33-855-2 |
| 1 | Digitrip RMS/R 500 Trip Unit | Figure 1-1 |
| 1 | RMS/R Rating Plug (600 Amp) | PR6A06A060 |
| 3 | Current Sensors (600/500/400/300/200:5) | 8184A39H01 |
| 1 | Auxiliary CT Module (With Ground G02) | 6502C78G01 |
| 1 | CT Module Extension Harness | 6502C84G01 |
| 1 | Umbilical Harness with Plug | 6502C83G02 |
| 1 | Direct Trip Actuator (DTA), DB-25 | 692C704G03 |
| 1 | Cell Plug, Wiring Harness & Terminal Block Assembly | 6502C71G01 |
| 2 | Hex Bolts (0.25-20 X 0.75) | Note: This hardware for use in mounting terminal block assembly and cell plug to switchgear cell. |
| 2 | Hex Bolts (0.25-20 X 0.50) | |
| 4 | Lock Washer (0.25) | |
| 4 | Hex Nut (0.25-20) | |
| 1 | Label, Digitrip RMS Retrofits | 8187A63H01 |
| 1 | DB-25 Parts Kit | 8188A36G02 |
| | (Style 8188A36G02 includes parts kit 6478C49G01), Including | |
| 3 | Copper Connector Plates | |
| 6 | Hex Bolt (0.50-13 X 3.0) | Mounts copper connector plates to breaker. |
| 6 | Lock Washer (0.50) | |
| 6 | Flat Washer (0.50) | |
| 6 | Hex Nut (0.50-13) | |
| 1 | Set (LH & RH) Trip Unit Assembly Mounting Brackets | |
| 2 | Hex Bolt (0.50-13 X 1.5) | |
| 2 | Lock Washer (0.50) | Mounts "T-Shaped" trip unit assembly mounting brackets to breaker frame. |
| 2 | Flat Washer (0.50) | |
| 2 | Hex Nut (0.50-13) | |
| 2 | Hex Bolt (0.375-16 X 1.5) | |
| 2 | Lock Washer (0.375) | |
| 2 | Flat Washer (0.375) | |
| 2 | Hex Nut (0.375-16) | |
| 1 | Sems Screw (0.25-20 X 0.50) | Mounts DTA to breaker platform. |
| 1 | Screw (0.190-32 X 0.75) | |
| 1 | Lock Washer (0.190) | |
| 1 | Flat Washer (0.190) | |
| 1 | Hex Nut (0.190-32) | (Tubular Spacer mounts on breaker crossbar) |
| 1 | DTA Rear Angle Bracket | |
| 1 | Tubular Spacer, Brass | |
| 1 | Set of Trip Unit Assembly Mounting Harware, Including: | |
| 2 | Screws (0.190-32 X 4.0) | Mounts trip unit to top of auxiliary CT module. |
| 2 | Lock Washer (0.190) | |
| 2 | Flat Washer (0.190) | |
| 2 | Tubular Spacers (0.70 Long) | |
| 2 | Trip Unit Mounting Clips (LH & RH) | |
| 4 | Screws (0.190-32 X 0.625) | Mounts LH and RH trip unit mounting clips to sides of auxiliary CT module. |
| 4 | Lock Washer (0.190) | |
| 4 | Flat Washer (0.190) | |
| 1 | Trip Unit Rear Barrier (Glass Polyester) | |
| 2 | Screws (0.190-32 X 0.625) | Mounts trip unit rear barrier to back of auxiliary CT module. |
| 2 | Lock Washer (0.190) | |
| 2 | Flat Washer (0.190) | |
| 2 | Sems Screw (0.25-20 X 0.50) | Mounts trip unit assembly to "T-shaped" brackets. |
| 1 | Overcurrent Wiring Harness | |
| 1 | Rubber Grommet (Slotted) | |
| 2 | Amp Splice Terminals | Terminals splice DTA leads to overcurrent harness. |
| 2 | Amp Splice Terminal Inserts | |
| 3 | Nylon Wire Clamp (0.375 ID) | |
| 3 | Screw (0.164-32 X 0.50) | Secures overcurrent wiring harness and PTM leads along its length |
| 3 | Lock Washer (0.164) | |
| 3 | Flat Washer (0.164) | |
| 3 | Hex Nut (0.164-32) | |
| 2 | Nylon Wire Clamp (0.375 ID) | Secures umbilical harness to auxiliary CT module. |
| 2 | Thread Cutting Screws (0.138-32) | |
| 5 | Nylon Wire Ties | For dressing breaker and cell harnesses. |
| 2 | Stick-on Nylon Wire Clamp | |
| 1 | Label, Digitrip RMS Retrofit | 8187A63H01 |

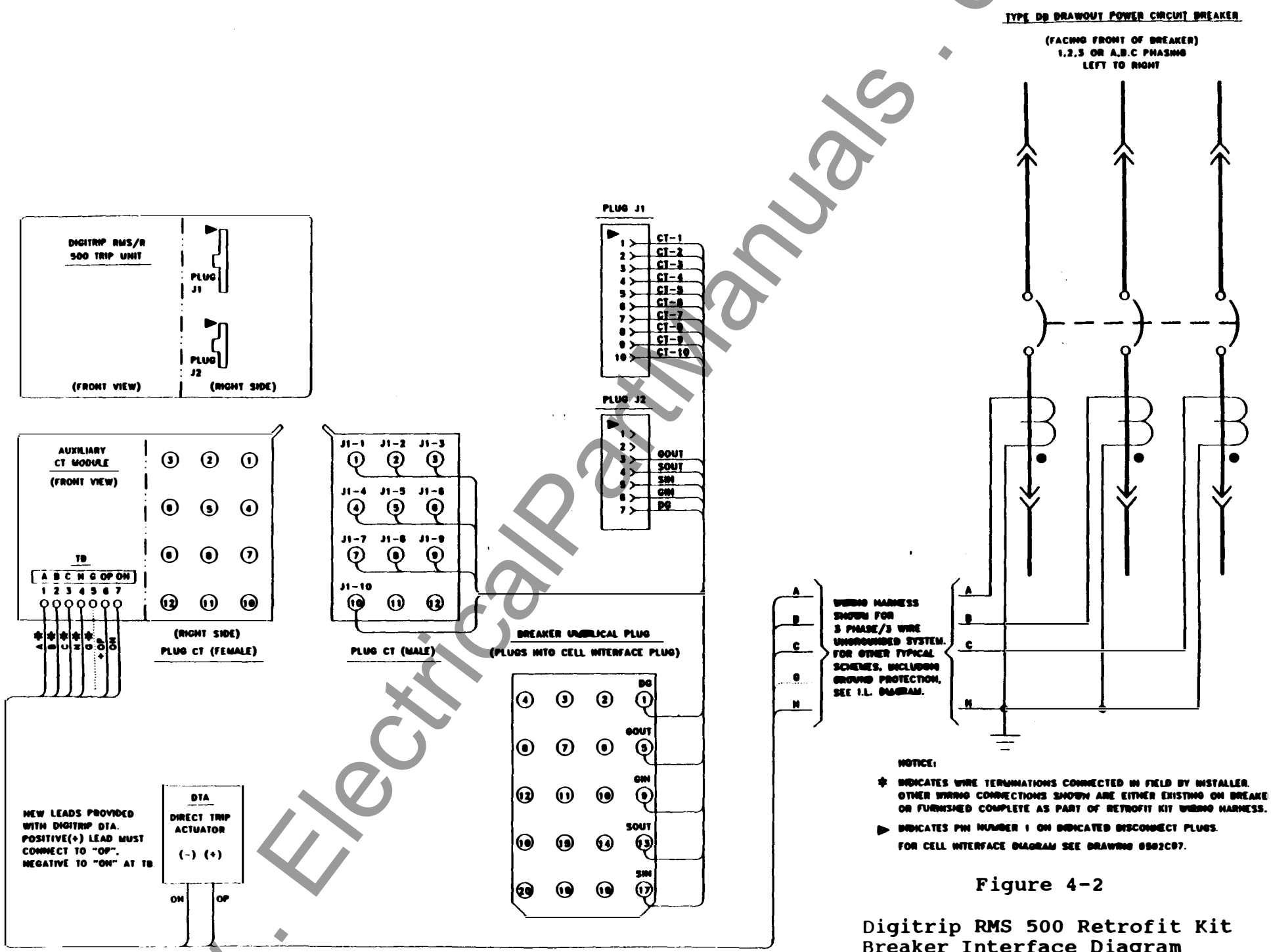
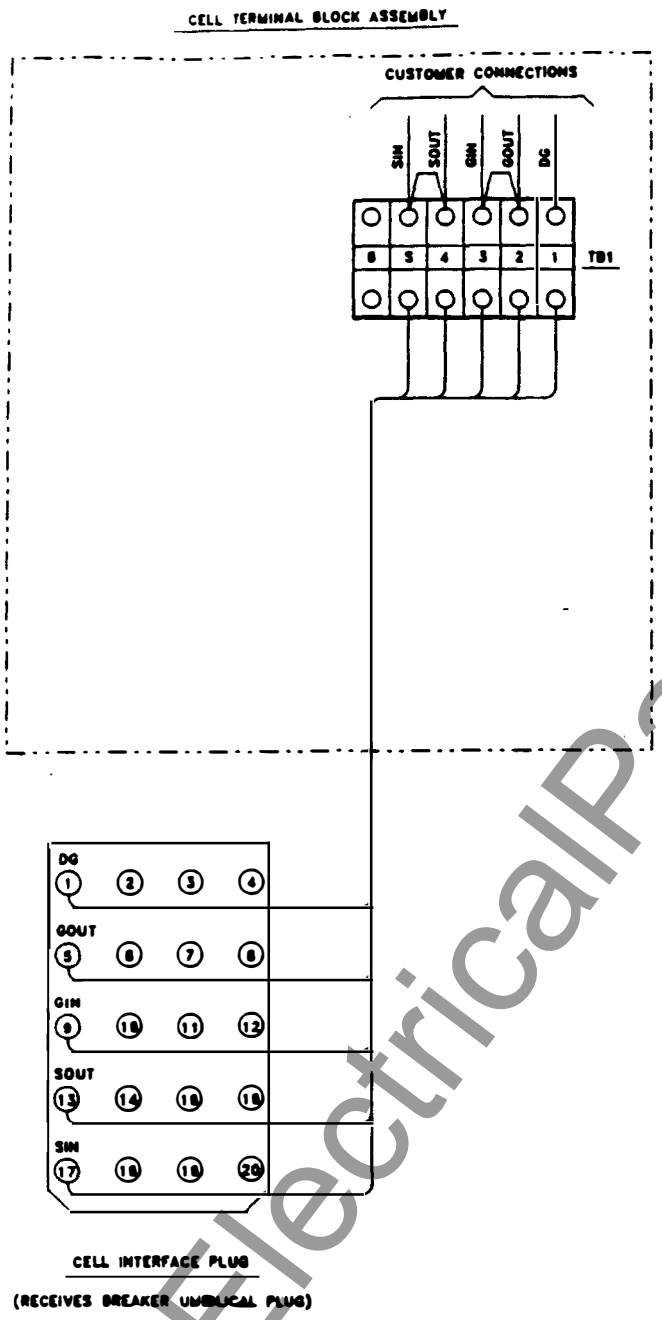



Figure 4-2

Digitrip RMS 500 Retrofit Kit
Breaker Interface Diagram
(With Zone Interl ing)




CUSTOMER TERMINAL BLOCK CONNECTIONS

| TERMINAL BLOCK POINT AND MARKING | | DESCRIPTION |
|---|---|---|
| TB1-1 | DG | ZONE INTERLOCK DIGITAL GROUND |
| TB1-2 | GOUT | ZONE INTERLOCK GROUND OUTPUT |
| TB1-3 | GIN | ZONE INTERLOCK GROUND INPUT |
| TB1-4 | SOUT | ZONE INTERLOCK SHORT DELAY OUTPUT |
| TB1-5 | SIN | ZONE INTERLOCK SHORT DELAY INPUT |

NOTICE:

1. ZONE INTERLOCK JUMPERS SIN-SOUT AND GIN-GOUT MUST BE INSTALLED ON TB1 OR BREAKER WILL TRIP INSTANTANEOUSLY ON SHORT TIME AND GROUND FAULT DELAY FUNCTIONS. REMOVE JUMPERS ONLY IF ZONE INTERLOCKING IS REQUIRED.
2. ALL WIRE TERMINATIONS SHOWN ARE FURNISHED COMPLETE WITH RETROFIT KIT WIRING HARNESS, EXCEPT THOSE INDICATED AS CUSTOMER CONNECTIONS.



Figure 4-3

Digitrip RMS 500 Retrofit Kit Switchgear Cell Interface Diagram
(With Zone Interlocking)

## Section 5

## Digitrip RMS 600 Retrofit Kits

### 5-1. Digitrip RMS 600 Retrofit Kit Selection & Content

The Digitrip RMS 600 Retrofit Kit series are shown in Figure 1-1. The applicable Digitrip RMS 600 Trip Unit overcurrent trip functions, i.e. Long Time (L), Short Time (S), Instantaneous (I), & Ground Fault Time (G) Delays are listed. Select the retrofit kit style to provide the required overcurrent trip functions of the DB-25 breaker to be retrofitted.

The complete Digitrip RMS 600 Retrofit Kit bill of material is listed in Figure 5-1. In addition to zone interlocking, the RMS 600 Trip Units include the Power Relay Module, ATR, which provides contact closures for remote indication and alarm. Zone interlocking and remote alarm signals are extracted from the trip unit by the umbilical harness with plug. The umbilical wiring harness includes a 20 pin plug, which connects to the cell plug, wiring harness, and terminal block assembly.

An external 120 Vac control source is required to power up the Power Relay Module (ATR) remote signals and the trip unit alphanumeric digital display. Figures 5-2 and 5-3 provide the retrofit kit wiring connections on the breaker and in the switchgear cell. All retrofit kit components are mounted on the breaker, except the cell plug, wiring harness, and terminal block assembly, which is mounted in the switchgear cell.

### 5-2. Digitrip RMS 600 Retrofit Kit Features

The Digitrip RMS 600 Trip Unit has the following features available for customer use, when applied in the Digitrip RMS 600 Retrofit Kit:

1. Basic (L,S,I,G) overcurrent protection, as selected.
2. True RMS Sensing.
3. Integral Trip Unit Testing.
4. Unit Status Indicator.
5. Local Mode of Trip Indicators.
6. Selectable $I^2t$ on Short Time and Ground Fault Time Delays when those options are selected.
7. Zone Interlock capabilities of the breaker Short Time and Ground Fault Delay functions, when those options are selected.
8. Local Four Digit Alpha-Numeric Display.
9. Remote Signal Contacts for high load and mode of trip indication.

The trip unit also includes provisions to accept the required rating plug. The rating plug is equipped with a battery to back-up the 120 Vac power the local mode of trip indicators obtained through the Power Relay Module (ATR).

Figure 5-1
Digitrip RMS 600 Retrofit Kits for DB & DBL-25 Breakers
Bill Of Material

| Qty | Description | Style |
|---|---|---|
| 1 | Instruction Leaflet Digitrip RMS DB & DBL-25 | IL 33-855-2 |
| 1 | Digitrip RMS/R 600 Trip Unit | Figure 1-1 |
| 1 | RMS/R Rating Plug (600 Amp) | PR6A06A060 |
| 3 | Current Sensors (600/500/400/300/200:5) | 8184A39H01 |
| 1 | Auxiliary CT Module (With Ground G02) | 6502C78G01 |
| 1 | CT Module Extension Harness | 6502C84G01 |
| 1 | Umbilical Harness with Plug | 6502C83G03 |
| 1 | Direct Trip Actuator (DTA), DB-25 | 692C704G03 |
| 1 | Cell Plug, Wiring Harness & Terminal Block Assembly | 6502C71G02 |
| 2 | Hex Bolts (0.25-20 X 0.75) | Note: This hardware for use in mounting terminal block assembly and cell plug to switchgear cell. |
| 2 | Hex Bolts (0.25-20 X 0.50) | |
| 4 | Lock Washer (0.25) | |
| 4 | Hex Nut (0.25-20) | |
| 1 | Label, Digitrip RMS Retrofits | 8187A63H01 |
| 1 | DB-25 Parts Kit (Style 8188A36G02 includes parts kit 6478C49G01), Including | 8188A36G02 |
| 3 | Copper Connector Plates | |
| 6 | Hex Bolt (0.50-13 X 3.0) | Mounts copper connector plates to breaker. |
| 6 | Lock Washer (0.50) | |
| 6 | Flat Washer (0.50) | |
| 6 | Hex Nut (0.50-13) | |
| 1 | Set (LH & RH) Trip Unit Assembly Mounting Brackets | |
| 2 | Hex Bolt (0.50-13 X 1.5) | |
| 2 | Lock Washer (0.50) | Mounts "T-Shaped" trip unit assembly mounting brackets to breaker frame. |
| 2 | Flat Washer (0.50) | |
| 2 | Hex Nut (0.50-13) | |
| 2 | Hex Bolt (0.375-16 X 1.5) | |
| 2 | Lock Washer (0.375) | |
| 2 | Flat Washer (0.375) | |
| 2 | Hex Nut (0.375-16) | |
| 1 | Sems Screw (0.25-20 X 0.50) | Mounts DTA to breaker platform. |
| 1 | Screw (0.190-32 X 0.75) | |
| 1 | Lock Washer (0.190) | |
| 1 | Flat Washer (0.190) | |
| 1 | Hex Nut (0.190-32) | (Tubular Spacer mounts on breaker crossbar) |
| 1 | DTA Rear Angle Bracket | |
| 1 | Tubular Spacer, Brass | |
| 1 | Set of Trip Unit Assembly Mounting Harware, Including: | |
| 2 | Screws (0.190-32 X 4.0) | Mounts trip unit to top of auxiliary CT module. |
| 2 | Lock Washer (0.190) | |
| 2 | Flat Washer (0.190) | |
| 2 | Tubular Spacers (0.70 Long) | |
| 2 | Trip Unit Mounting Clips (LH & RH) | |
| 4 | Screws (0.190-32 X 0.625) | Mounts LH and RH trip unit mounting clips to sides of auxiliary CT module. |
| 4 | Lock Washer (0.190) | |
| 4 | Flat Washer (0.190) | |
| 1 | Trip Unit Rear Barrier (Glass Polyester) | |
| 2 | Screws (0.190-32 X 0.625) | Mounts trip unit rear barrier to back of auxiliary CT module. |
| 2 | Lock Washer (0.190) | |
| 2 | Flat Washer (0.190) | |
| 2 | Sems Screw (0.25-20 X 0.50) | Mounts trip unit assembly to "T-shaped" brackets. |
| 1 | Overcurrent Wiring Harness | |
| 1 | Rubber Grommet (Slotted) | |
| 2 | Amp Splice Terminals | Terminals splice DTA leads to overcurrent harness. |
| 2 | Amp Splice Terminal Inserts | |
| 3 | Nylon Wire Clamp (0.375 ID) | Secures overcurrent wiring harness and PTM leads along its length |
| 3 | Screw (0.164-32 X 0.50) | |
| 3 | Lock Washer (0.164) | |
| 3 | Flat Washer (0.164) | |
| 3 | Hex Nut (0.164-32) | |
| 2 | Nylon Wire Clamp (0.375 ID) | Secures umbilical harness to auxiliary CT module. |
| 2 | Thread Cutting Screws (0.138-32) | |
| 5 | Nylon Wire Ties | For dressing breaker and cell harnesses. |
| 2 | Stick-on Nylon Wire Clamp | |
| 1 | Label, Digitrip RMS Retrofit | 8187A63H01 |

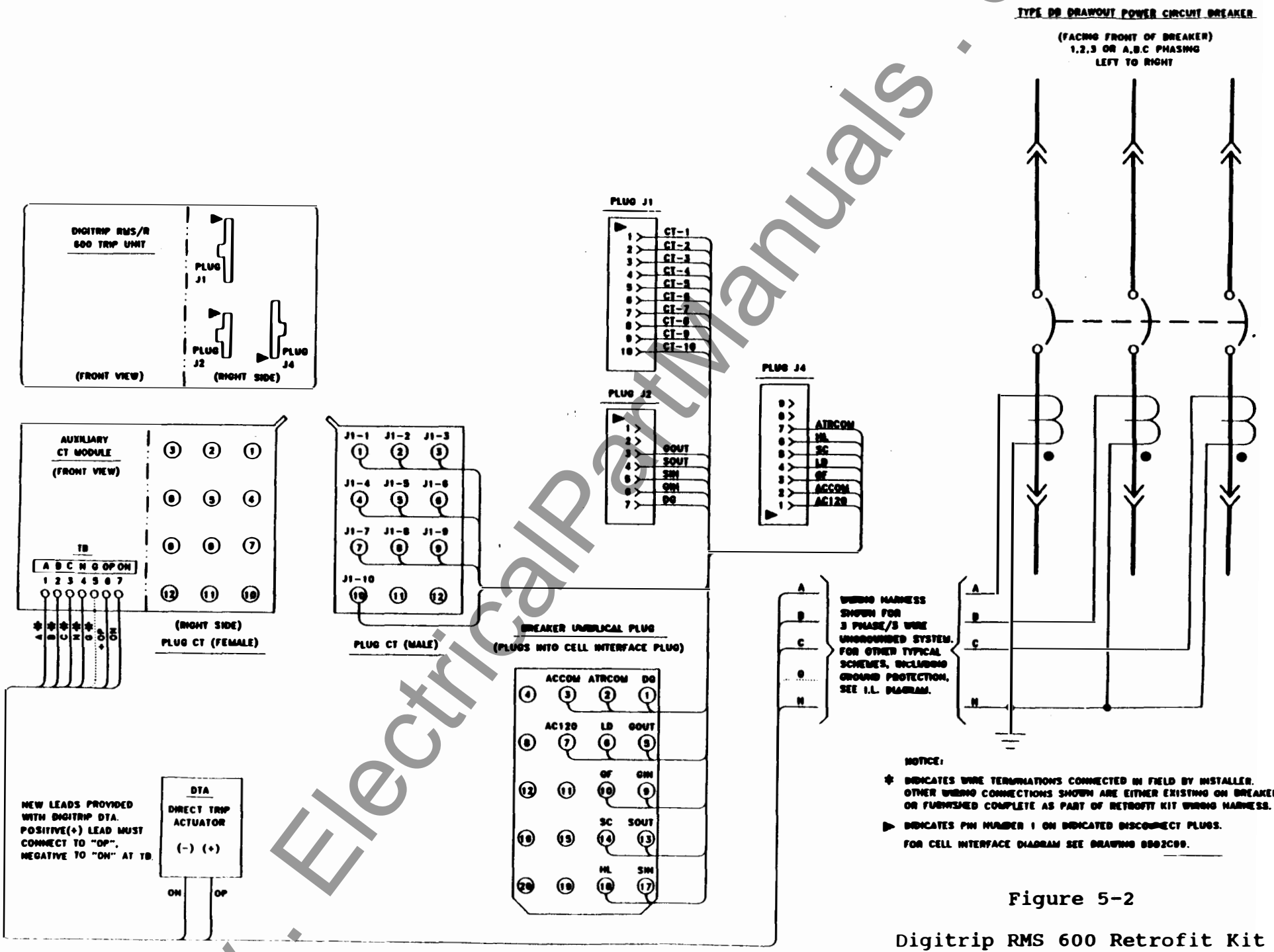
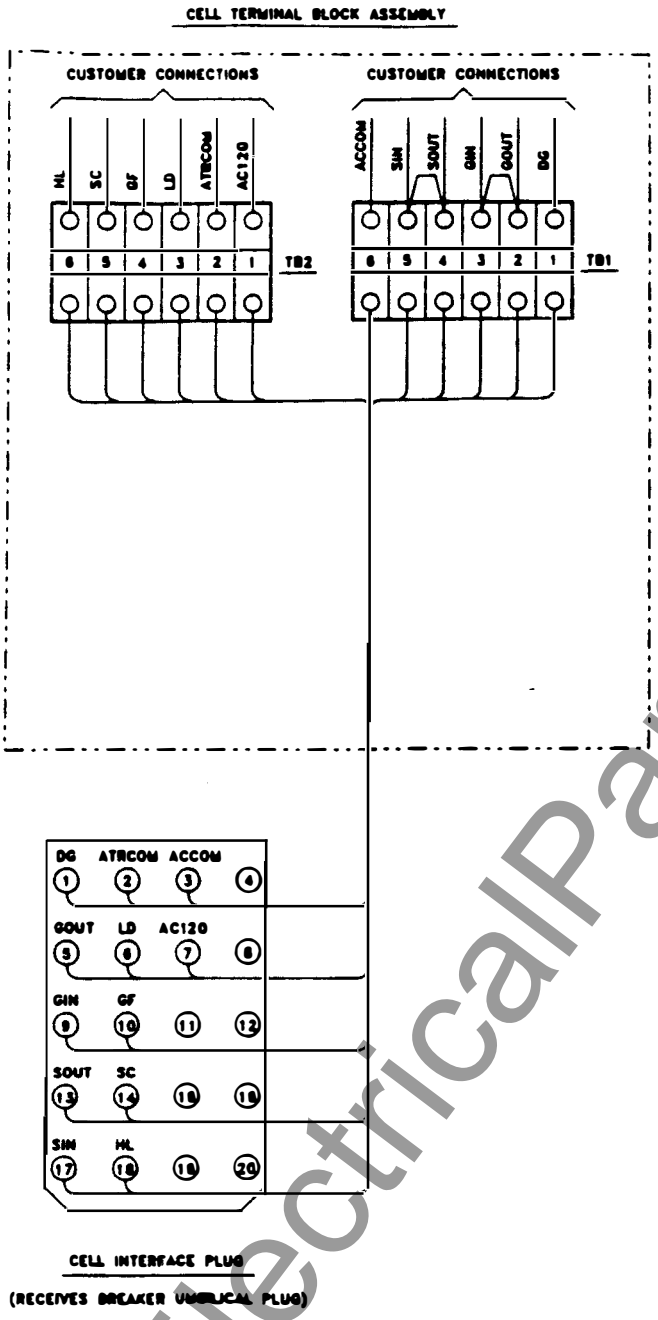



Figure 5-2

Digitrip RMS 600 Retrofit Kit
Breaker Interface D ram




CUSTOMER TERMINAL BLOCK CONNECTIONS

| TERMINAL BLOCK POINT AND MARKING | | DESCRIPTION |
|---|---|---|
| TB1-1 | DG | ZONE INTERLOCK DIGITAL GROUND |
| TB1-2 | GOUT | ZONE INTERLOCK GROUND OUTPUT |
| TB1-3 | GIN | ZONE INTERLOCK GROUND INPUT |
| TB1-4 | SOUT | ZONE INTERLOCK SHORT DELAY OUTPUT |
| TB1-5 | SIN | ZONE INTERLOCK SHORT DELAY INPUT |
| TB1-6 | ACCOM | ATR 120VAC INPUT COMMON |
| TB2-1 | AC120 | ATR 120VAC INPUT POSITIVE |
| TB2-2 | ATRCOM | ATR ALARM CONTACT COMMON |
| TB2-3 | LD | ATR LONG DELAY TRIP ALARM |
| TB2-4 | GF | ATR GROUND FAULT TRIP ALARM |
| TB2-5 | SC | ATR SHORT CIRCUIT TRIP ALARM |
| TB2-6 | HL | ATR HIGH LOAD ALARM |

NOTICE:

1. ZONE INTERLOCK JUMPERS SIN-SOUT AND GIN-GOUT MUST BE INSTALLED ON TB1 OR BREAKER WILL TRIP INSTANTANEOUSLY ON SHORT TIME AND GROUND FAULT DELAY FUNCTIONS. REMOVE JUMPERS ONLY IF ZONE INTERLOCKING IS REQUIRED.
2. ALL WIRE TERMINATIONS SHOWN ARE FURNISHED COMPLETE WITH RETROFIT WIRING HARNESS, EXCEPT THOSE INDICATED AS CUSTOMER CONNECTIONS.
3. ATR CONTACTS ARE RATED 1 AMPERE AT 120 VAC OR 1 AMPERE AT 28 V.



Figure 5-3

Digitrip RMS 600 Retrofit Kit Switchgear Cell Interface Diagram

## Section 6

## Digitrip RMS 700 & 800 Retrofit Kits

### 6-1. Digitrip RMS 700 & 800 Retrofit Kit Selection & Content

The Digitrip RMS 700 & 800 Retrofit Kit series are shown in Figure 1-1. The applicable Digitrip RMS Trip Unit overcurrent trip functions, i.e. Long Time (L), Short Time (S), Instantaneous (I), & Ground Fault Time (G) Delays are listed. Select the retrofit kit style to provide the required overcurrent trip functions of the DB-25 breaker to be retrofitted.

The complete Digitrip RMS 700 & 800 Retrofit Kit bills of material are listed in Figure 6-1. Digitrip RMS 700 & 800 Retrofit Kits feature INCOM Communications capability when applied with the Westinghouse Integrated Monitoring Protection and Control Communications (IMPACC) System. The RMS 700 & 800 Kits have essentially the same content, except the RMS 800 Trip Unit has a local alphanumeric display. INCOM Communication, zone interlocking, and remote alarm signals are extracted from the trip unit by a umbilical wiring harness with plug. The umbilical wiring harness includes a 20 pin plug, which connects to the cell plug, wiring harness, and terminal block assembly.

An external 120 Vac control source is required to power up the Power Relay Module (ATR) remote signals, INCOM Communications, and the Digitrip RMS 800 Trip Unit alphanumeric digital display. A Potential Transformer Module (PTM) provides the distribution system voltage input to the trip unit. The PTM is provided with a disconnect plug which is to be disconnected in the event of breaker dielectric testing. Figures 6-2 and 6-3 provide the retrofit kit wiring connections on the breaker and in the switchgear cell. All retrofit kit components are mounted on the breaker, except the cell plug, wiring harness, and terminal block assembly.

### 6-2. Digitrip RMS 700 & 800 Retrofit Kit Features

Digitrip RMS 700 & 800 Trip Units have the following features available for customer use, when applied in Digitrip RMS Retrofit Kits:

1. Basic (L,S,I,G) overcurrent protection, as selected.
2. True RMS Sensing.
3. Integral Trip Unit Testing.
4. Unit Status Indicator.
5. Local Mode of Trip Indicators.
6. Selectable $I^2t$ on Short Time and Ground Fault Time Delays when those options are selected.
7. Zone Interlock capabilities of the breaker Short Time and Ground Fault Delay functions, when those options are selected.

8. Local Four Digit Alpha-Numeric Display (Digitrip RMS 800 only).
9. Remote Signal Contacts for high load and mode of trip indication.
10. INCOM Communications when applied with the Westinghouse IMPACC System.
11. Energy Monitoring Capability.

The trip unit also includes provisions to accept the required rating plug. The rating plug is equipped with a battery to back-up the 120 Vac power the Local Mode of Trip Indicators obtained through the Power Relay Module (ATR).

Figure 6-1
Digitrip RMS 700 & 800 Retrofit Kits for DB & DBL-25 Breakers
Bill Of Material

| Qty | Description | | Style |
|---|---|---|---|
| 1 | Instruction Leaflet Digitrip RMS DB & DBL-25 | | IL 33-855-2 |
| 1 | Digitrip RMS/R 700 or 800 Trip Unit | | Figure 1-1 |
| 1 | RMS/R Rating Plug (600 Amp) | | PR6A06A060 |
| 3 | Current Sensors (600/500/400/300/200:5) | | 8184A39H01 |
| 1 | Auxiliary CT Module (With Ground G02) | | 6502C78G01 |
| 1 | CT Module Extension Harness | | 6502C84G01 |
| 1 | Umbilical Harness with Plug | | 6502C83G04 |
| 1 | Direct Trip Actuator (DTA), DB-25 | | 692C704G03 |
| 1 | Potential Transformer Module (PTM) Kit, Including | | 6502C82G01 |
| 1 | PT Module with primary and secondary disconnect plugs, 3 #16 AWG wire leads, and metal barrier with Warning label. | | |
| 2 | Screw (0.138-32 X 0.50) | Mounts PTM to trip unit insulating barrier. | |
| 4 | Lock Washer (0.138) | | |
| 4 | Flat Washer (0.138) | | |
| 2 | Hex Nut (0.138-32) | | |
| 3 | Ring Tongue Terminals (0.50 ID) | | |
| 1 | DTA Auxiliary Switch Kit, Including | | 8188A38G01 |
| 1 | Microswitch with Lever Arm | | |
| 1 | Switch Mounting Bracket | | |
| 2 | Flat Head Screws (0.138-32 X 1.0) | Mounts microswitch to switch mounting bracket. | |
| 2 | Lock Washers (0.138) | | |
| 2 | Flat Washers (0.138) | | |
| 2 | Hex Nuts (0.138-32) | | |
| 2 | Screws (0.190-32 X 0.375) | Mounts switch mounting bracket to DTA. | |
| 2 | Lock Washers (0.190) | | |
| 2 | Flat Washers (0.190) | | |
| 1 | Cell Plug, Wiring Harness & Terminal Block Assembly | | 6502C71G03 |
| 2 | Hex Bolts (0.25-20 X 0.75) | Note: This hardware for use in mounting terminal block assembly and cell plug to switchgear cell. | |
| 2 | Hex Bolts (0.25-20 X 0.50) | | |
| 4 | Lock Washer (0.25) | | |
| 4 | Hex Nut (0.25-20) | | |
| 1 | Label, Digitrip RMS Retrofits | | 8187A63H01 |
| 1 | DB-25 Parts Kit | | 8188A36G02 |
| | (Style 8188A36G02 includes parts kit 6478C49G01), Including | | |
| 3 | Copper Connector Plates | | |
| 6 | Hex Bolt (0.50-13 X 1.0) | Mounts copper connector plates to breaker. | |
| 6 | Lock Washer (0.50) | | |
| 6 | Flat Washer (0.50) | | |
| 6 | Hex Nut (0.50-13) | | |
| 1 | Set (LH & RH) Trip Unit Assembly Mounting Brackets | | |
| 2 | Hex Bolt (0.50-13 X 1.5) | Mounts "T-Shaped" trip unit assembly mounting brackets to breaker frame. | |
| 2 | Lock Washer (0.50) | | |
| 2 | Flat Washer (0.50) | | |
| 2 | Hex Nut (0.50-13) | | |
| 2 | Hex Bolt (0.375-16 X 1.5) | | |
| 2 | Lock Washer (0.375) | | |
| 2 | Flat Washer (0.375) | | |
| 2 | Hex Nut (0.375-16) | | |
| 1 | Semi Screw (0.25-20 X 0.50) | Mounts DTA to breaker platform. | |
| 1 | Screw (0.190-32 X 0.75) | | |
| 1 | Lock Washer (0.190) | | |
| 1 | Flat Washer (0.190) | | |
| 1 | Hex Nut (0.190-32) | (Tubular Spacer mounts on breaker crossbar) | |
| 1 | DTA Rear Angle Bracket | | |
| 1 | Tubular Spacer, Brass | | |
| 1 | Set of Trip Unit Assembly Mounting Hardware, Including: | | |
| 2 | Screws (0.190-32 X 4.0) | Mounts trip unit to top of auxiliary CT module. | |
| 2 | Lock Washer (0.190) | | |
| 2 | Flat Washer (0.190) | | |
| 2 | Tubular Spacers (0.70 Long) | | |
| 2 | Trip Unit Mounting Clips (LH & RH) | | |
| 4 | Screws (0.190-32 X 0.625) | Mounts LH and RH trip unit mounting clips to sides of auxiliary CT module. | |
| 4 | Lock Washer (0.190) | | |
| 4 | Flat Washer (0.190) | | |
| 1 | Trip Unit Rear Barrier (Glass Polyester) | | |
| 2 | Screws (0.190-32 X 0.625) | Mounts trip unit rear barrier to back of auxiliary CT module. | |
| 2 | Lock Washer (0.190) | | |
| 2 | Flat Washer (0.190) | | |
| 2 | Semi Screw (0.25-20 X 0.50) | Mounts trip unit assembly to "T-shaped" brackets. | |
| 1 | Overcurrent Wiring Harness | | |
| 1 | Rubber Grommet (Slotted) | | |
| 2 | Amp Splice Terminals | Terminals splice DTA leads to overcurrent harness. | |
| 2 | Amp Splice Terminal Inserts | | |
| 3 | Nylon Wire Clamp (0.375 ID) | Secures overcurrent wiring harness and PTM leads along its length | |
| 3 | Screw (0.164-32 X 0.50) | | |
| 3 | Lock Washer (0.164) | | |
| 3 | Flat Washer (0.164) | | |
| 3 | Hex Nut (0.164-32) | | |
| 2 | Nylon Wire Clamp (0.375 ID) | Secures umbilical harness to auxiliary CT module. | |
| 2 | Thread Cutting Screws (0.138-32) | | |
| 5 | Nylon Wire Ties | For dressing breaker and cell harnesses. | |
| 2 | Stick-on Nylon Wire Clamp | | |
| 1 | Label, Digitrip RMS Retrofit | | 8187A63H01 |

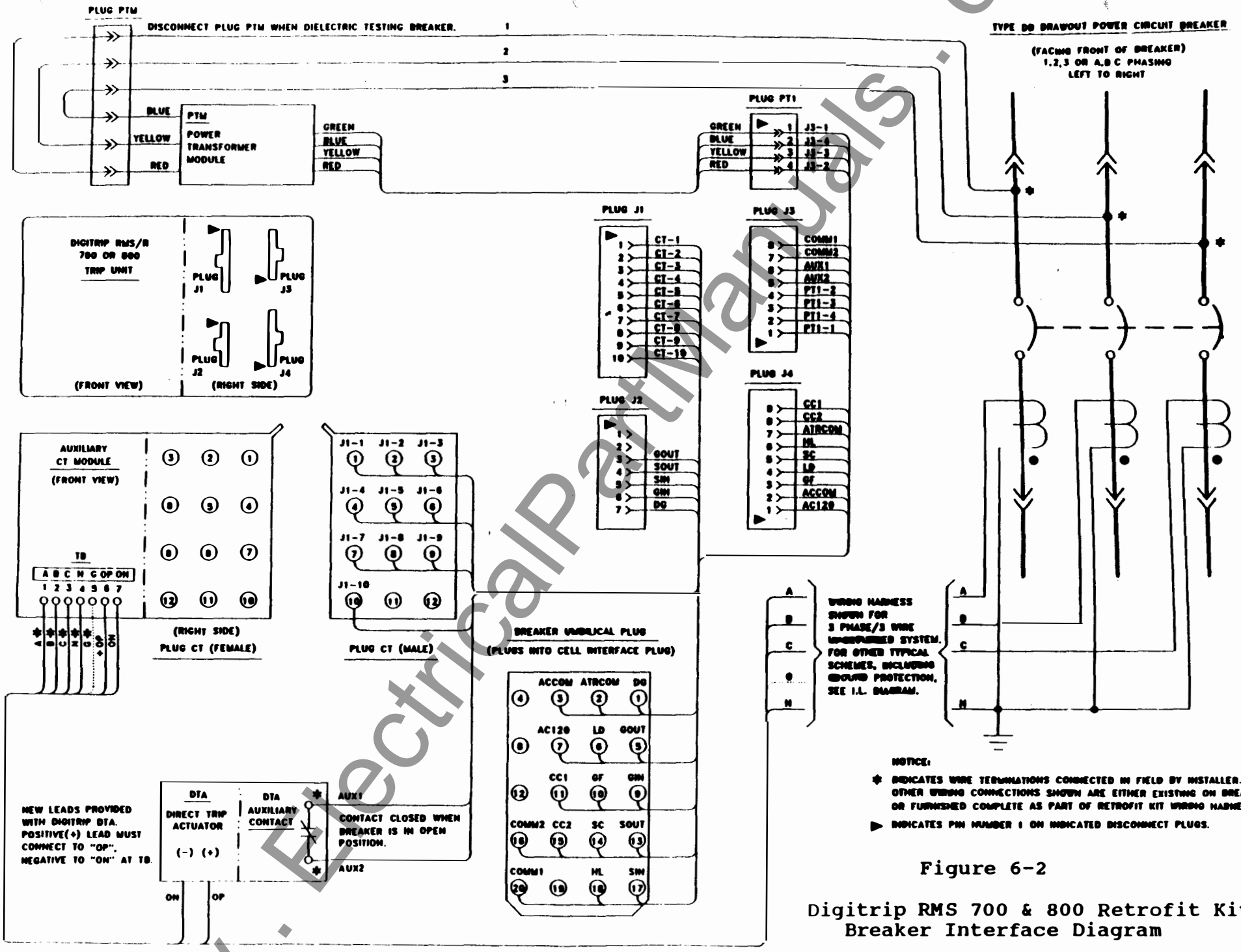
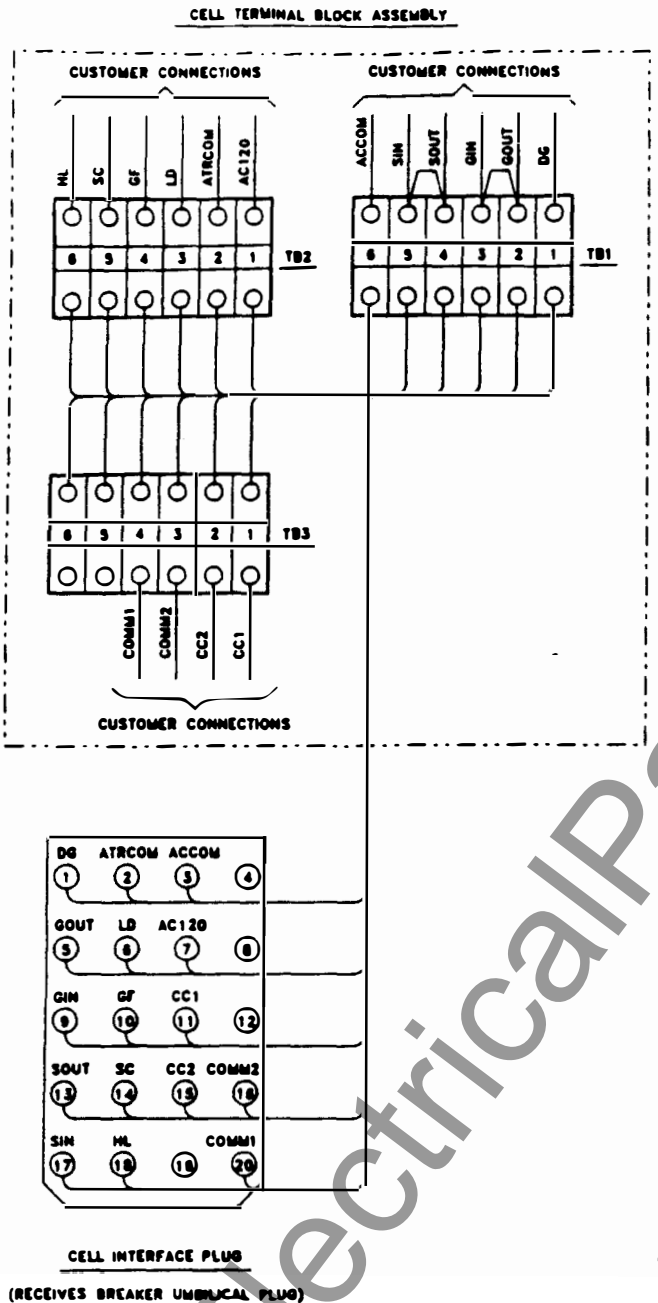



Figure 6-2

Digitrip RMS 700 & 800 Retrofit Kit
Breaker Interface Diagram




CUSTOMER TERMINAL BLOCK CONNECTIONS

| TERMINAL BLOCK POINT AND MARKING | | DESCRIPTION |
|---|---|---|
| TB1-1 | DG | ZONE INTERLOCK DIGITAL GROUND |
| TB1-2 | GOUT | ZONE INTERLOCK GROUND OUTPUT |
| TB1-3 | GIN | ZONE INTERLOCK GROUND INPUT |
| TB1-4 | SOUT | ZONE INTERLOCK SHORT DELAY OUTPUT |
| TB1-5 | SIN | ZONE INTERLOCK SHORT DELAY INPUT |
| TB1-6 | ACCOM | ATR 120VAC INPUT COMMON |
| TB2-1 | AC120 | ATR 120VAC INPUT POSITIVE |
| TB2-2 | ATRCOM | ATR ALARM CONTACT COMMON |
| TB2-3 | LD | ATR LONG DELAY TRIP ALARM |
| TB2-4 | GF | ATR GROUND FAULT TRIP ALARM |
| TB2-5 | SC | ATR SHORT CIRCUIT TRIP ALARM |
| TB2-6 | HL | ATR HIGH LOAD ALARM |
| TB3-1 | CC1 | INCOM CONTACT OUTPUT TO BKR REMOTE CLOSE CKT |
| TB3-2 | CC2 | INCOM CONTACT OUTPUT TO BKR REMOTE CLOSE CKT |
| TB3-3 | COMM1 | INCOM TWISTED PAIR CONNECTION |
| TB3-4 | COMM2 | INCOM TWISTED PAIR CONNECTION |
| TB3-5 | | FREE TERMINAL FOR TWISTED PAIR SHIELD, ETC. |
| TB3-6 | | FREE TERMINAL FOR TWISTED PAIR SHIELD, ETC. |

NOTICE:

1. ZONE INTERLOCK JUMPERS SIN-SOUT AND GIN-GOUT MUST BE INSTALLED ON TB1 OR BREAKER WILL TRIP INSTANTANEOUSLY ON SHORT TIME AND GROUND FAULT DELAY FUNCTIONS. REMOVE JUMPERS ONLY IF ZONE INTERLOCKING IS REQUIRED.
2. ALL WIRE TERMINATIONS SHOWN ARE FURNISHED COMPLETE WITH RETROFIT KIT WIRING HARNESS, EXCEPT THOSE INDICATED AS CUSTOMER CONNECTIONS.
3. ATR CONTACTS ARE RATED 1 AMPERE AT 120 VAC OR 1 AMPERE AT 28 VDC.

Figure 6-3

Digitrip RMS 700 & 800 Retrofit Kit Switchgear Cell Interface Diagram

## Section 7

## General Preparation for Retrofit

### 7-1 TOOLS & ACCESSORIES RECOMMENDED FOR INSTALLATION

The tools and accessories recommended for the various retrofit kit installations are as follows:

1. Ratchet (3/8") socket set with 7/16 " to 3/4" sockets, straight edge, scriber, small (instrument size) and medium size screwdrivers, pliers, wire cutters, and hammer.

2. Electric Drill, 0.25-20" tap, 0.190-32" tap, tap holder.

3. Drill bits may be required as follows:

| Bit Dimension | Bit Size | Used for |
|---|---|---|
| 0.159 | 21 | 0.190-32 tap hole |
| 0.196 | 9 | 0.190 inch clearance hole |
| 0.2010 | 7 | 0.190 inch clearance hole |
| 0.257 | F | 0.25 inch clearance hole |
| 0.266 | H | 0.25 inch clearance hole |

4. Auxiliary Power Module (APM), Catalog Number PRTAAPM, for powering the Digitrip RMS Trip Unit during testing.

**Note:**

A 120 Vac supply can be used, rather than an APM for powering Digitrip RMS 600, 700, and 800 during testing. See Section 10.

5. Adjustable 0-28 Vdc power supply (optional, for independant testing of the Direct Trip Actuator).

6. Feeler gage (1/32 to 1/8 inch range).

7. Wire strippers and crimpers (suitable for use with #16 and #22 AWG wire).

## Section 8

## Digitrip RMS Installation Instructions for DB & DBL-25 Breakers

**WARNING**

**POSSIBLE PERSONNEL INJURY OR DEATH AND EQUIPMENT DAMAGE. READ ALL THE INFORMATION PROVIDED IN THIS LEAFLET BEFORE STARTING THE RETROFIT KIT INSTALLATION. THIS INSTALLATION SHOULD ONLY BE CARRIED OUT BY PERSONNEL FAMILIAR WITH THE HAZARDS ASSOCIATED WITH WORKING ON POWER CIRCUIT BREAKERS AND SWITCHGEAR ASSEMBLIES.**

Read the information provided in this manual and become familiar with its contents. Check the items received in the retrofit kit against the Digitrip RMS Style Number bill of material listed in this leaflet. Some items supplied may not be required for the breaker retrofitted and will be left over after the retrofit kit installation is completed. The following steps identified herein are required to install the retrofit kit components on the breaker element.

### 8-1. Breaker Preparation

1. Remove the breaker element from the switchgear assembly. Take it to a well lighted work area to install the retrofit kit.
2. Confirm that the breaker position indicator reads "OPEN" and the breaker is in the OPEN position.
3. Remove the 3 primary disconnecting contacts from the lower studs at the rear of the breaker.

### 8-2. Installation of the Copper Connector Plates

1. Refer to Figure 8-1. Remove the 3 electromechanical trip devices and their associated mounting hardware from the breaker.
2. Remove the electromechanical trip device trip paddles (all 3 phases) from the breaker trip bar. This will reduce the force required to trip the breaker.
3. Replace the electromechanical trip devices with the 3 copper connector plates (one per pole) provided.
4. Fasten each connector plate to the breaker using the 6 sets 0.50-13 X 1.5 inch hex bolts, lock washers, flat washers, and nuts provided.

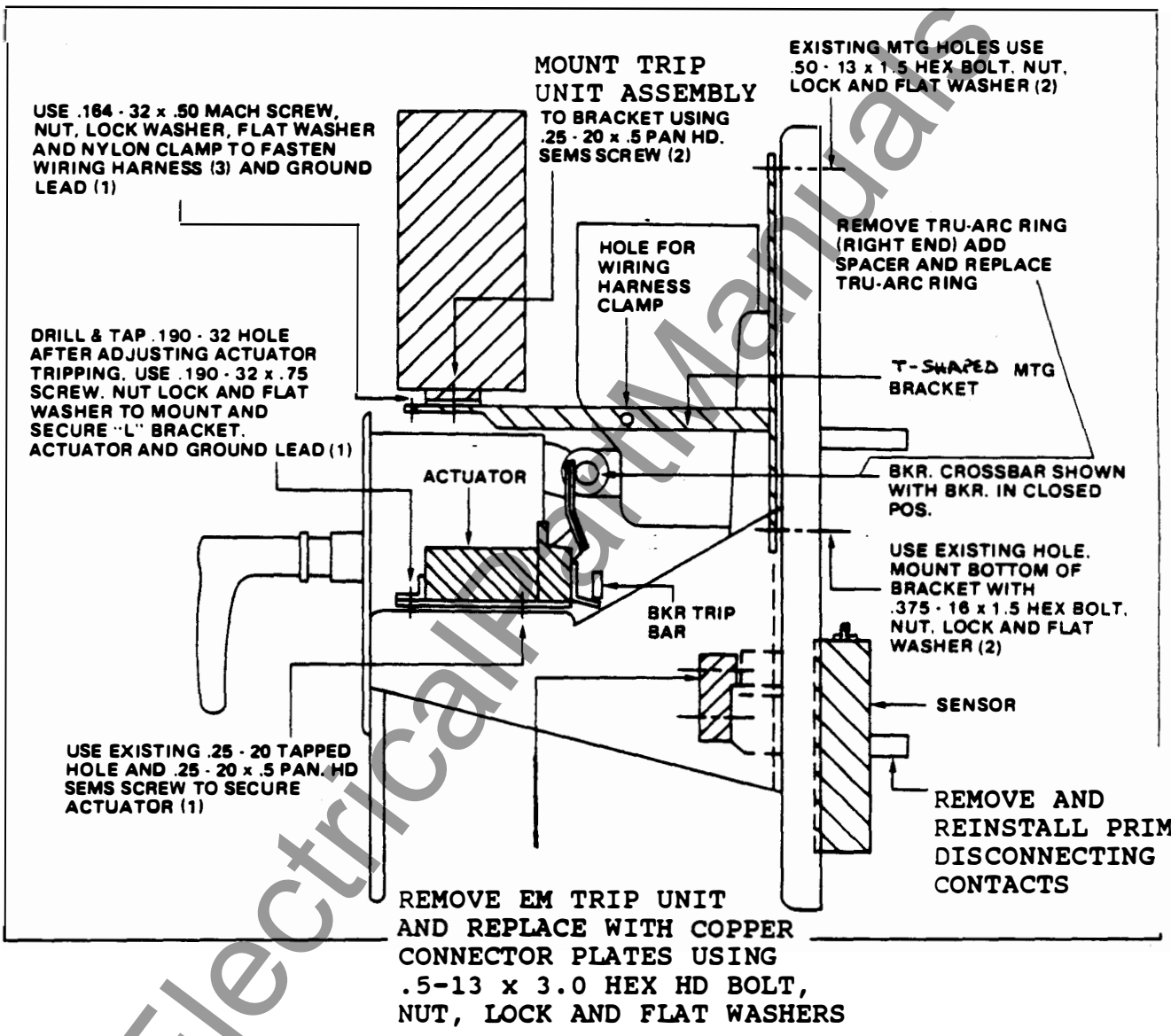



Figure 8-1

DB-25 Breaker Retrofit Kit Installation

## 8-3. Installation of the Direct Trip Actuator (DTA)

The DTA installation on the DB-25 breaker is shown in Figure 8-2.

**CAUTION**

**USE ONLY THE PROPER DIGITRIP RMS STYLE DTA PROVIDED WITH 700 OHM COIL OR THE CIRCUIT BREAKER MAY NOT TRIP, CAUSING PERSONNEL INJURY AND/OR EQUIPMENT DAMAGE.**

1. (Optional) Remove the center (or righthand) phase arc chute from the breaker. Manually push the breaker moving arcing contacts tword the closed position (DO NOT LATCH THE BREAKER) until they touch the stationary arcing contacts. Clamp the touching contacts together with a suitable wire tie. This moves the breaker crossbar out of the way to facilitate the DTA installation.

2. Operate and test the Direct Trip Actuator (DTA) several times before installing it. Alternately, pull back on the reset arm to reset the DTA. Then trip the DTA by applying 28 VDC to the DTA terminal leads. Be sure to observe the proper polarity to the positive lead.

3. If a DTA Auxiliary Switch Kit is provided, (RMS 700 and 800 only) install the switch kit to the DTA as follows:

   a. Mount the microswitch to the switch mounting angle using 2 sets of 0.138-32 X 1.0 screws, lock washers, flat washers, and nuts.

   b. Align the 0.190-32 threaded holes of the mircoswitch bracket assembly to the predrilled holes in the DTA bracket. Secure the assembly using 2 sets of 0.190-32 X 0.375 screws, lock washers, and flat washers.

   c. After assembly, test the DTA and switch for proper operation by moving the DTA reset arm all the way back to reset the DTA. The DTA reset arm should actuate the microswitch lever arm and the switch should change state as the DTA is reset. Adjust the microswitch switch lever arm for optimal switch operation by bending to suit.

4. Reset the DTA and place it on the breaker platform. Align the hole in the DTA bracket with the existing 0.25-20 hole in the breaker platform. The DTA trip tab should be located under the breaker trip bar. Secure the DTA to the platform using the 0.25-20 X 0.5 sems screw provided. Align the right edge of the DTA base parallel to the right hand side of the breaker platform.

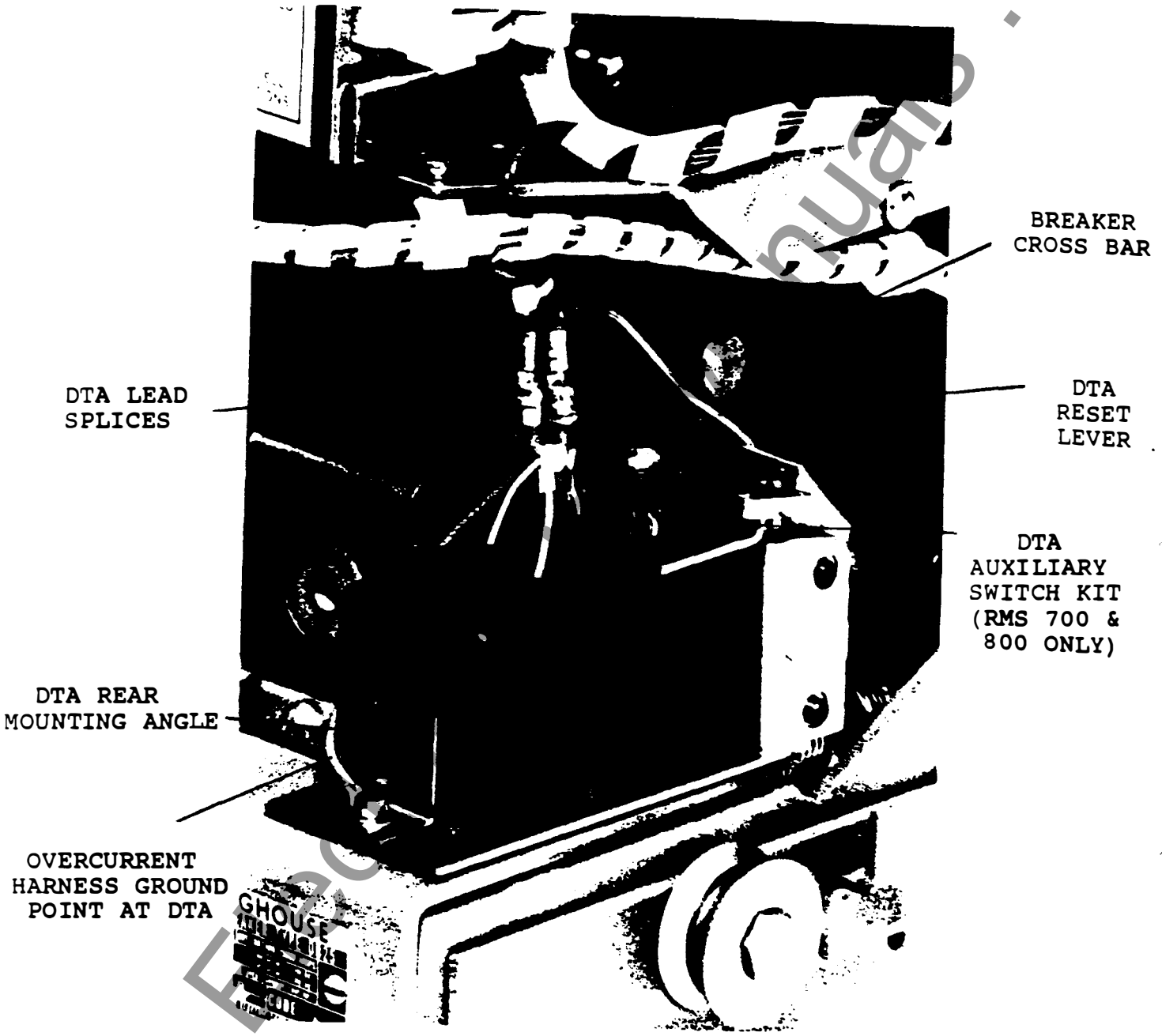



**Figure 8-2**

**Direct Trip Actuator (DTA) Installation on DB-25 Breaker**

**CAUTION:**

**WHEN RETROFITTING THE DBL-25, MAKE SURE THERE IS NO INTERFERENCE BETWEEN THE ACTUATOR TRIPPING LINKAGE AND THE BREAKER LIMITER TRIPPING SCREW.**

5. To ensure proper DTA adjustment and breaker operation, a small gap (1/32 to 1/8 inch) is required between the trip tab of the DTA and the breaker trip bar, when the breaker is closed. Remove the clamp from the breaker arcing contacts (if performed above). Close the breaker and visually examine the gap. If the gap is not correct, trip the breaker and adjust the DTA trip tab by slight bending until the correct gap is obtained. Recheck the gap with the breaker closed. After the adjustment is complete, close the breaker and trip it by applying 28 VDC to the DTA to ensure proper operation.

6. Using the small hole existing at the rear of the DTA mounting plate as a template, drill and tap a 0.190-32 hole (or drill a through hole for a 0.190 screw) in the breaker platform. Fasten the DTA to breaker with the DTA rear mounting angle and the 0.190-32 X 0.75 screw, lock washer, flat washer, and nut

7. Remove the tru-arc retaining ring from the right end of the breaker crossbar. Slide the tubular brass spacer provided over the crossbar so it is snug against the insulating link. Install the tru-arc ring.

## 8-4. Installing the Trip Unit Assembly

1. Refer to Figure 8-1. Mount the "T-shaped" lefthand and righthand trip unit assembly mounting brackets to the breaker as follows:

   a. Remove the existing 0.50 inch hardware that holds the breaker lift bracket to the top lefthand side of the breaker rear frame. Place the "T-shaped" lefthand bracket over the breaker lift bracket and align the holes. Secure the top of the bracket with 1 set of 0.50-13 X 1.5 inch hex bolt, lockwasher, flat washer, and hex nut.

   b. Mount the "T-shaped" righthand side bracket using the above procedure.

   c. Secure the bottom hole of the lefthand and righthand "T-shaped" brackets to the existing holes in the breaker rear frame using two sets of 0.375-16 X 1.5 inch hex bolts, lock washers, flat washers, and hex nuts.

2. The Trip Unit Assembly is shown in Figure 8-3. It is assembled as follows:

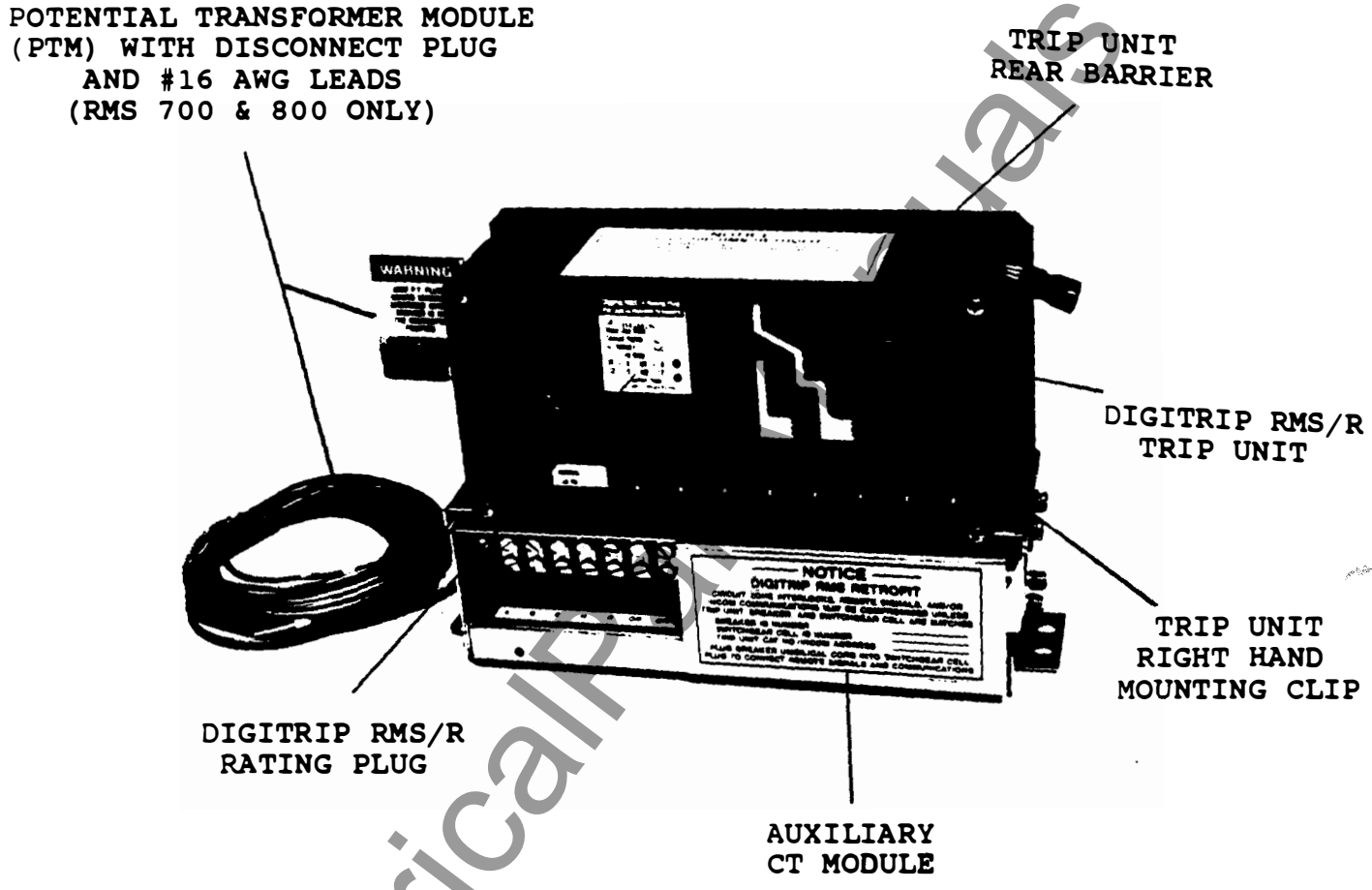



Figure 8-3

Trip Unit Assembly

a. Mount the Digitrip RMS/R Trip Unit to the threaded inserts in the top of the Auxiliary CT Module using 2 sets of 0.190-32 X 4.0 screws, lock washers, flat washers, and 0.70 inch long tubular spacers. The hollow tubular spacers fit in the cavity between the trip unit case and the top of the CT module.

b. Mount the left hand and right hand trip unit mounting clips to the threaded inserts on the sides of the CT module using 4 sets of 0.190-32 X 0.50 screws and lock washers. The ends of the trip unit clips fit into the slots in the front sides of the trip unit case.

c. If a Potential Transformer Module (PTM) Kit is included (RMS 700 and 800 kits only), mount the PTM to the predrilled holes in the trip unit rear barrier (glass polyester) using 2 sets of 0.138 X 0.5 screws, lock washers (2), flat washers (2), and hex nuts. The PTM barrier (with nameplate) and disconnect plug will hang over the lefthand side of the barrier.

d. Align the pre-drilled holes in the bottom of the trip unit rear barrier to the threaded inserts in the rear of the CT module. Fasten the barrier to the CT module using 2 sets of 0.190-32 X 0.625 screws, lock washers, and flat washers.

3. Place the trip unit assembly on the "T-shaped" trip unit mounting brackets. Align the holes in the mounting feet of the auxiliary CT module with the existing 0.25-25 threaded holes on the brackets. Secure the trip unit assembly to the brackets with 2 0.25-20 X 0.5 inch sems screws.

8-5. Connecting the Potential Transformer Module (PTM) Leads (RMS 700 and 800 Only)

1. Route the #16 AWG PTM leads, Figure 8-3, to inner side of the left hand "T-shaped" trip unit mounting bracket. Secure the leads to the inner surface of the side bracket using the predrilled hole in the bracket, a 0.375 inch ID nylon wire clamp, and a 0.164-32 X 0.5 inch screw, lock washer , flat washer, and nut.

2. Determine the routing and length of the PTM leads to the copper connector plates (previously installed) on phases A, B, C or 1, 2, 3.

**Notice:**

The standard convention for breaker phasing is A,B,C or 1,2,3 left to right when facing the front of the breaker. The PTM phasing to the disconnect plug is Red, Yellow, Blue as A, B, C or 1, 2, 3. The phase inputs to the PTM must correspond to the sensor phase inputs to Digitrip RMS. Tagging the leads from the PTM disconnect plug to the connector hole location is recommended to assure the proper phasing convention is maintained.

3. Cut and strip the ends of the PTM leads. Crimp the .50 ID ring tongue terminal lugs provided on the PTM leads. Remove the 0.50-13 hex nuts from the bottom set of bolts on each connector. Place the PTM lead terminals over the hex bolts and secure to the connector using the 0.50 inch flat washers, lock washers. and hex nuts. When torquing be careful not to strain the wires and crimps. Dress the PTM leads, as required, using 3 of nylon wire ties provided.

**CAUTION**

**IMPROPER ROUTING OF THE PTM WIRES COULD CAUSE PERSONAL INJURY AND/OR EQUIPMENT DAMAGE. AVOID SHARP CORNERS AND PATHS THAT COULD CAUSE INTERFERENCE BETWEEN THE PTM WIRES, BREAKER ELEMENT, AND SWITCHGEAR CELL.**

## 8-6. Installing the Current Sensors

1. All 3 primary disconnecting contacts were previously removed from the breaker lower stud assemblies.

2. Slide the current sensors over the lower stud assembly on each phase. The sensor terminals should be oriented toward the top of the breaker and the sensor nameplates facing out.

3. Assemble the primary disconnects on each upper stud assembly.

## 8-7. Installation of the Wiring Harnesses

Familiarize yourself to the applicable breaker interface and switchgear cell interface diagrams (Sections 3 though 6) for your retrofit kit. Before installing the wiring harnesses described herein, check each terminal and pin on all harnesses and plugs to ensure they are crimped and/or seated properly.

1. The overcurrent wiring harness, which connects the current sensors to the auxiliary CT module, is installed as follows:

a. To cover both 3 and 4 wire system applications, the overcurrent harness includes two wires to permit the 4th wire connection. These two wires (one tan and one green) are readily identifiable; they are the longest two wires that protrude from the sensor end of the harness. Refer to Figure 8-4, determine the applicable wiring diagram (A, B, C, or D) for your application, and perform the following:

   1. If the retrofit is for a 3 wire system (Diagram A or B) the wires provided for the 4th wire connection are unnecessary. Cut the terminals off the long green wire and the long tan wire protruding from the sensor end of the harness. Identify and confirm the other end of each wire with an ohmeter and then remove the two wires by sliding them out of the harness.

   2. If the retrofit is for a 4 wire system (Diagram C or D) the green and tan wires provided for the 4th wire connection are required for connection to an open set of breaker secondary contacts.

   **Note:**

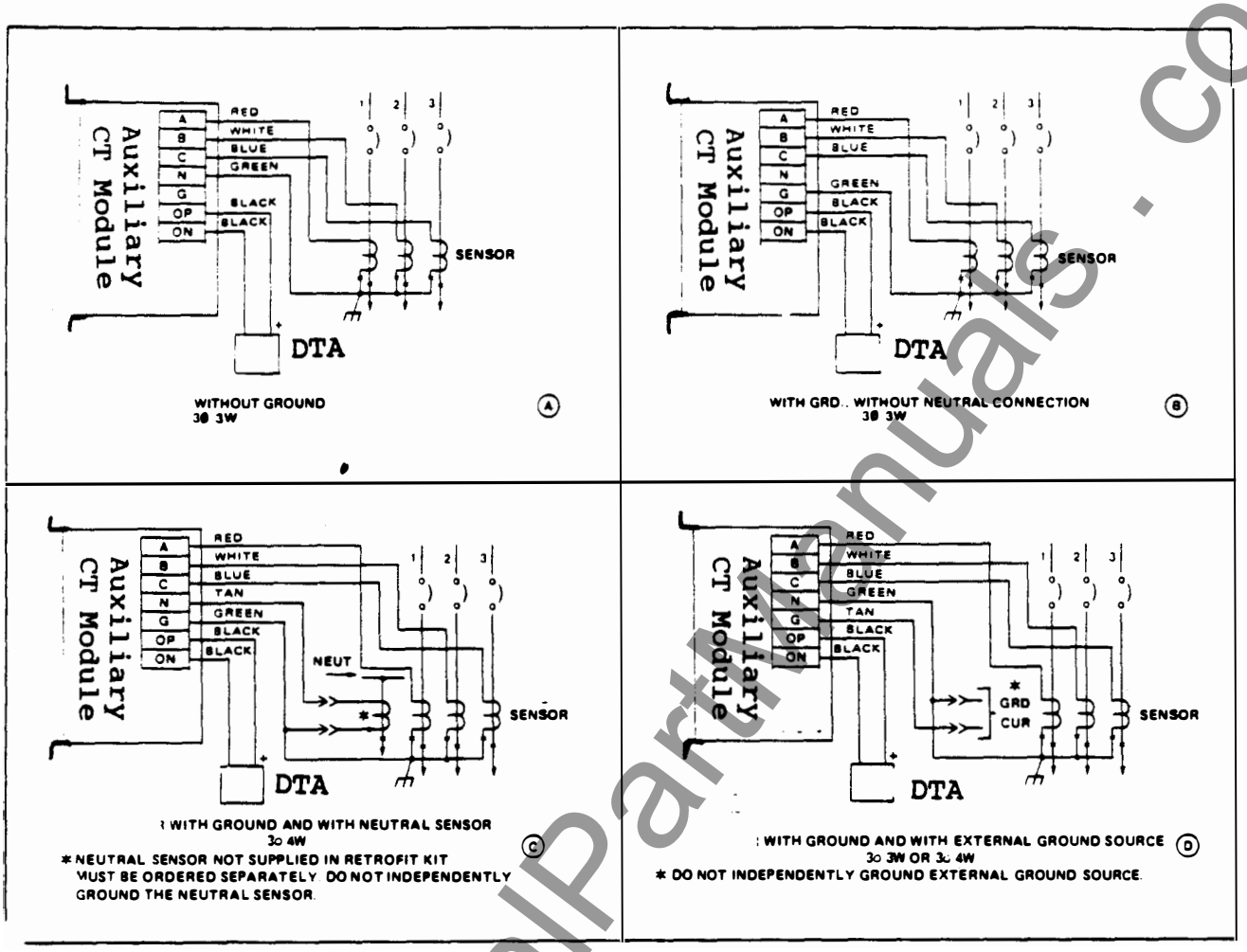
   For 4 wire grounded systems, the breaker and cell secondary contacts (if required) and the 4th sensor for the switchgear neutral are not included in the kit content. These items must be ordered separately from the kits.

b. Refer to Figure 8-4 and select the sensor tap for the desired breaker current rating. Confirm the required sensor tap connections and proper polarity markings on the sensor. Connect and tighten the harness leads to the sensor terminals. The harness terminals should be placed between the hex nuts at the sensor terminals. Do not overtighten the innermost nut or allow it to turn while tightening the outer nut or the sensor internal connections may be damaged.

   **Note:**

   For RMS/R 700 and 800 kits, proper power flow conventions must be maintained as follows to assure the trip unit reads positive power:

   Standard Power Flow Convention (power flow top to bottom): In most cases, the breaker primary (bus side) is on the upper and the secondary (load side) is on the lower stud assemblies when the breaker is racked into its designated switchgear cell. The trip unit will read positive power when the current flows from top to bottom, provided the sensors are




| Desired Current | Sensor Style Number | Correct Connections Are Taps | Use Rating Plug Catalog Number |
|---|---|---|---|
| 100 Amperes | 8184A39H01 | X1*-X2 | PR6A02A010 |
| 200 Amperes | 8184A39H01 | X1* – X2 | PR6A02A020 |
| 400 Amperes | 8184A39H01 | X2* – X4 | PR6A04A040 |
| 600 Amperes | 8184A39H01 | X1* – X4 | PR6A06A060 |

* = This terminal has polarity

**Figure 8-4**

**Overcurrent Harness and Sensor Tap Connection Diagrams**

mounted on the lower stud assemblies with the sensor nameplates facing out and the overcurrent wiring harness is connected to the sensor terminal polarity shown in Figure 8-4. Power flow in the opposite direction (bottom to top) will then read as negative power.

Non-Standard Convention (power flow bottom to top): In some cases, the breaker primary (bus side) is on the lower and the secondary (load side) is on the upper stud assemblies when the breaker is racked into its designated switchgear cell. The trip unit will read positive power when the current flows from bottom to top, provided the sensors are mounted on the lower stud assemblies with the sensor nameplates facing out and the overcurrent wiring harness is connected to the sensor terminal polarity opposite to that shown in Figure 8-4. Power flow in the opposite direction (top to bottom) will then read as negative power.

c. Facing the rear of the breaker, place the slotted grommet in the lower slot of the left side of the breaker rear frame. Route the wiring harness through the grommet and pull to the lower front of the breaker.

d. Route the overcurrent harness around to the front of the breaker. Connect the harness leads to the auxiliary CT module terminal block terminals A through ON per the applicable wiring diagram. The harness may be longer than required, if so, it can be looped.

e. Connect the leads from the auxiliary CT module terminal block terminals OP and ON to the DTA leads as follows:

   1. Cut off the spade terminals from the existing DTA leads, leaving approximately 3 inches of wire length for termination. Strip each lead approximately 0.25 inches from the wire end. Transfer the "+" polarity wire marker to the positive wire lead.

   2. Find the leads from the overcurrent wiring harness connected to auxiliary CT module terminals "OP and ON." The lead connected to "OP" is identified by a "+" wire marker at the end. Determine the final routing of the leads to the DTA. Cut the overcurrent harness leads to length and strip the wire ends approximately 0.25 inches from the end. Transfer the "+" wire marker to the lead connected to "OP".

   3. Slide the insert terminals provided over the wire ends of leads "OP" and "ON" and the DTA leads. Place the leads (large insert barrel first) into the splice terminals provided as shown in Figure 8-2. Crimp lead "OP" to the positive DTA lead and "ON" to the negative DTA lead using the splice terminals and inserts provided.

**CAUTION:**

**THE POSITIVE (+) MARKED DTA LEAD MUST BE CONNECTED TO TERMINAL LEAD "OP" AND THE NEGATIVE TO "ON". FAILURE TO OBSERVE THE PROPER POLARITY WILL PROHIBIT THE DIRECT TRIP ACTUATOR TO PROPERLY TRIP THE BREAKER.**

f. **Connect the green lead from the overcurrent harness (connected to auxiliary CT terminal "N") to the rear angle bracket of the DTA as shown in Figure 8-2. Use the 0.190-32 hardware previously installed.**

g. **Dress the harness path along its length using the 3 sets of 0.375 ID nylon wire clamps and 0.164-32 X 0.75 inch screws, lock washers, flat washers, and hex nuts provided. Two pre-drilled holes exist in the righthand "T" shaped bracket and one at the front of the auxiliary CT module for this purpose. Clamp the overcurrent harness to the inner side of the righthand bracket.**

2. **<u>The CT Extension Harness</u> connects the 12 pin Auxiliary CT Module plug CT to the 10 pin trip unit plug J1. Check the harness for proper terminations. Plug the 12 pin white male plug (CT) into the female plug on the right side of the CT Module. Be sure the nylon plugs lock together with the locking straps on either side snapping into place. Plug and lock the 10 pin black plug J1 into 10 pin receptical on the right side of the trip unit.**

3. **<u>The Umbilical Harness</u> is provided on all kits, except the Basic RMS 500 series. Depending on the kit selected, it includes plugs J2, J3, J4, PTM1 and the breaker umbilical plug. The umbilical harness extracts the applicable Digitrip RMS/R Zone Interlocking, Remote Alarm, and INCOM Communication Signals from the trip unit to the switchgear cell.**

**RMS/R 700 and 800 harnesses also include the following:**

a. **Plug J3, a 4 pin black female plug PT1, which connects to the black male plug from the PTM module.**

b. **Two leads with ring tongue terminals (AUX1 and AUX2) for connection to the normally open contact and common DTA Auxiliary Switch terminals. The normally open contact on the microswitch is in the closed state when the breaker is in the open position.**

**As applicable, connect umbilical harness plugs J2, J3, and J4 into the right side of the trip unit and AUX1 and AUX2 to the DTA Auxiliary Switch normally open contact.**

4. The Zone Interlock Shorting Plug is provided on the Basic RMS 500 series kits only. This plug connects to trip unit plug J2 and shorts out GIN to GOUT and SIN to SOUT, as applicable. The breaker will trip instantaneously on short time and ground delay functions, unless the zone interlock shorting plug is installed.

5. Dress the CT Extension Harness and the Umbilical Harness to the breaker and each other using the nylon clamps and wire ties provided. Install two 0.375 inch ID nylon cable clamps to the predrilled holes on the right side of the Auxiliary CT Module using two 0.138-32 X 0.50 inch thread cutting screws provided.

**CAUTION:**

**ROUTE ALL WIRING AND HARNESSES AWAY FROM BREAKER MOVING PARTS. AVOID ROUTES THAT COULD CAUSE STRAIN AT PLUG CONNECTIONS AND THAT COULD INTERFERE WITH THE BREAKER/SWITCHGEAR CELL INTERFACE.**

## 8-8. Rating Plug Installation

Your Digitrip RMS retrofit kit is provided with a 600 amp rating plug, Catalog PR6A06A060 as standard. Other Digitrip rating plugs are available as listed in Figure 1-2. The rating plug used must be coordinated with the sensor tap rating selected as shown in Figure 8-4. All RMS/R rating plugs are provided with an extra stick-on nameplate for use if the trip unit is vertical or horizontal.

To install the rating plug, remove the clear plastic cover and 4 mounting screws located at the front of the trip unit. Then plug the rating plug into the receptical of the trip unit. Install the cover and cover hardware.

## Section 9

## Switchgear Cell Retrofit Kit Installation

**CAUTION**

**HAZARDOUS VOLTAGES EXIST IN SWITCHGEAR CELL
POSSIBLE PERSONNEL INJURY OR DEATH AND EQUIPMENT DAMAGE.
DEENERGIZE ALL PRIMARY AND SECONDARY POWER SOURCES
TO THE SWITCHGEAR ASSEMBLY PRIOR TO WORKING ON
THE SWITCHGEAR CELL.**

The following steps identified herein are required to install the retrofit kit components in the switchgear cell. The breaker element must be removed from the switchgear cell and the primary and secondary power sources deenergized.

9-1. CELL TERMINAL BLOCK ASSEMBLY INSTALLATION (All retrofit kits accept the RMS 500 Basic Kit)

Refer to Figure 9-1. This figure simulates a breaker in the cell, plugged into a cell terminal block assembly. Place the Terminal Block Assembly Mounting Plate against the switchgear cell right hand side sheet. Two mounting holes are located on the Terminal Block Assembly Mounting Plate. Remove the cover assembly to obtain access to these holes. Using the mounting plate as a template, mark the side sheet. Center punch and drill two clearance holes using a 0.257 (size F) to 0.266 (size H) drill bit. Mount the Terminal Block Assembly Mounting Plate with the two sets of 0.25-20 X 0.75 inch hex bolts, lock washers, flat washers, and hex nuts provided.

9-2. CELL PLUG AND WIRING HARNESS INSTALLATION (All retrofit kits except the RMS 500 Basic Kit)

1. Locate the Cell Plug Mounting Bracket on the right hand side sheet close to the front of the switchgear cell. Use the cell plug mounting bracket as a template and mark and drill two clearance holes (0.257 - 0.266). Mount the cell plug mounting bracket with the two sets of 0.25-20 X 0.50 inch hex bolts, lock washers, flat washers, and hex nuts provided.

2. Fasten the wiring harness between the terminal block assembly and cell pluf using one stick-on type wire clamp provided.

9-3. CELL DOOR LABEL INSTALLATION

Install the Digitrip RMS Retrofit Kit ID label 8187A63H01 on the inside of the switchgear cell door on a visable location.

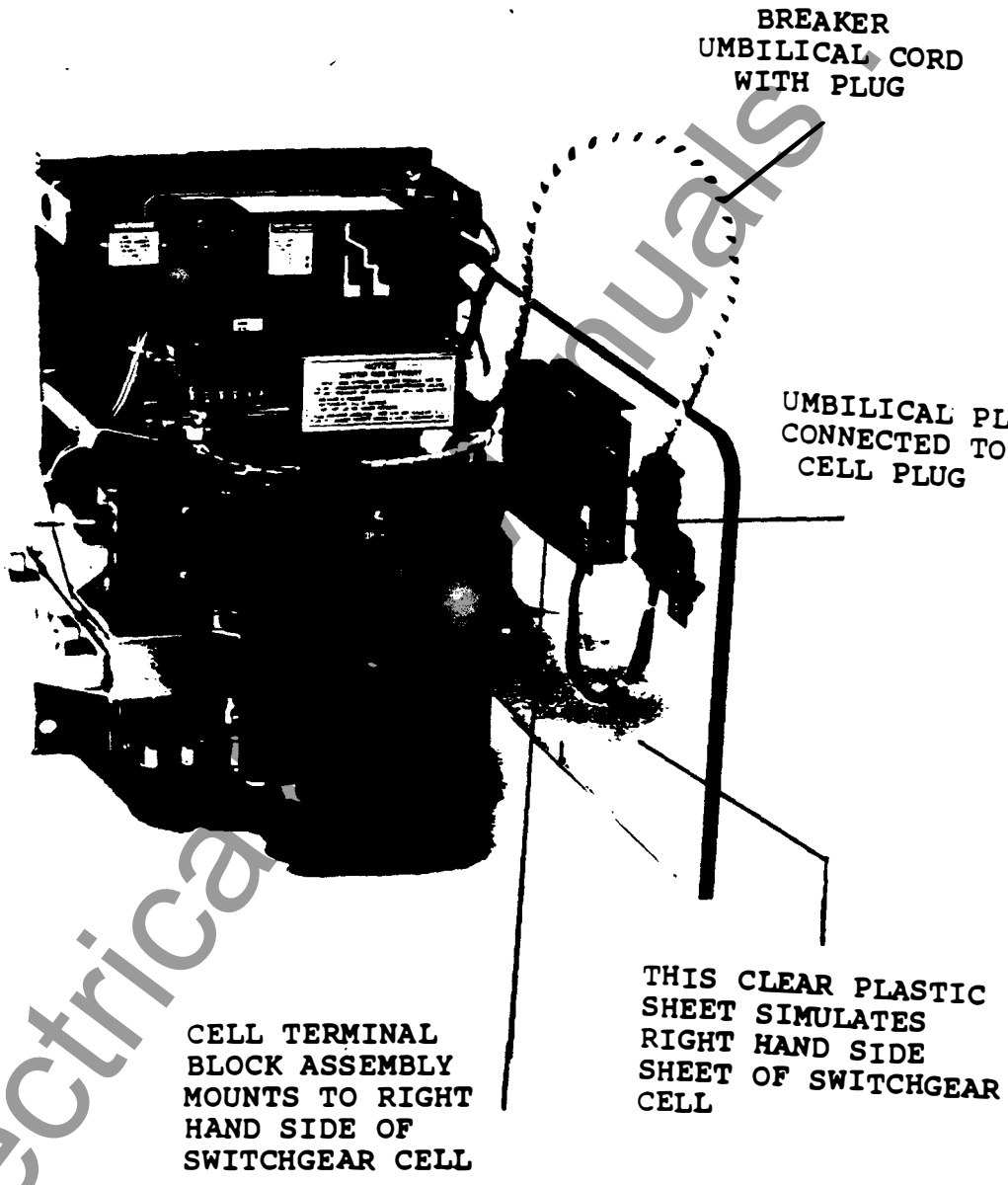



**Figure 9-1**

**DB-25 Breaker Connected to Cell Plug, Wiring Harness, and Terminal Block Assembly (All Kits except RMS 500 Basic)**

## Section 10

## Testing, Checkout, and Settings

### 10-1 TESTING THE DIGITRIP RMS TRIP SYSTEM

The Digitrip RMS overcurrent trip system may be tested by using one of three possible methods, including The Digitrip Self Test, the Amptector Test Kit (with the use of a an Amptector Test Kit Adapter Harness), and primary injection testing (e.g. Multi-Amp or EIL).

**CAUTION**

**DO NOT USE THE AMPTECTOR TEST KIT TO TEST DIGITRIP RMS WHILE THE BREAKER IS IN THE "CONNECTED" POSITION IN THE SWITCHGEAR CELL COMPARTMENT.**

**ALSO, USE OF THE DIGITRIP RMS SELF TEST SYSTEM WHILE IN THE BREAKER IS IN THE "CONNECTED" POSITION IN THE SWITCHGEAR CELL COMPARTMENT IS NOT RECOMMENDED. THE TRIPPING ACTION OF THE CIRCUIT BREAKER WILL CAUSE DISRUPTION OF SERVICE AND POSSIBLE PERSONAL INJURY RESULTING FROM UNNECESSARY SWITCHING OF CONNECTED EQUIPMENT.**

**TESING SHOULD BE PERFORMED ONLY WHEN THE BREAKER IS LEVERED TO THE "TEST", "DISCONNECTED", or "REMOVED" POSITIONS.**

**Note:**

**Digitrip RMS has a memory circuit that simulates the time required to cool down of overloaded conductors. When performing repeated Long Delay Testing, the results may be erroneous as the memory circuit must discharge prior to the next test. The memory circuit can be discharged by disconnecting the power source (APM or 120 Vac input) to the trip unit between tests or by waiting several minutes between tests.**

### 10-2. DIGITRIP RMS SELF TESTING

The Digitrip RMS Self Testing System requires one of two external power sources (discussed below) to operate. Detailed instructions for Digitrip RMS Self Testing are provided in the appropriate Digitrip RMS Trip Unit Instruction Leaflet identified in the REFERENCES section of this document.

1. Auxiliary Power Module

   **The Auxiliary Power Module (APM), Catalog Number PRTAAPM, is an optional accessory item used to power the Digitrip RMS Trip Unit Self Testing System. The APM is plugged into the the Digitrip Trip Unit test port and connected to a 120 Vac 50/60 Hz circuit. The Digitrip RMS Self Test System is then enabled by pressing the "TEST" pushbutton.**

2. External 120 Vac Source to Power/Relay Module

Digitrip RMS Models 600, 700, & 800 Trip Units are equipped with an Power/Relay Module (ATR). The ATR has input provisions for an external 120 Vac source. When 120 Vac power is supplied to Digitrip RMS through the cell terminal block assembly terminals "AC120" and "ACCOM," the 120 Vac power can be brought to the ATR by plugging in the breaker umbilical harness. Then the Digitrip RMS Self Test System can be started when the "TEST" pushbutton is pressed.

## 10-3 AMPTECTOR TEST KIT

**CAUTION**

**POSSIBLE DAMAGE TO TRIP UNIT**
**DO NOT USE AMPTECTOR TEST KIT STYLES 140D481G01 OR G02**
**USE AMPTECTOR TEST KIT STYLES 140D481G02R, 140D481GO2RR,**
**OR 140D481G03 ONLY**

Digitrip RMS/R Trip Units can be tested over a partial range using either style 140D481G02R, 140D481G02RR or 140D481G03 Amptector Test Kit and a test kit adapter harness. The adapter harness includes a receptical for receiving the test kit banana plug and a set of ring-tongue terminals for connecting to the auxiliary CT module terminal block terminals. For additional instructions on testing Digitrip RMS with the Amptector test kit see the REFERENCES section of this document.

When testing Digitrip RMS/R with the Amptector Test Kit, an external power source to the trip unit is required. Use either the Auxiliary Power Module (APM) or the 120 Vac input to the Power/Relay Module (Models 600, 700, or 800 only) as discussed above.

**NOTE:**

The Amptector Test Kit produces a maximum of 40 to 48 amperes when connected to Digitrip RMS. Test kit outputs are limited to 8-9 times the Rating Plug In rating. This restricts the test range for Short Delay and Instantaneous Testing.

## 10-4. PRIMARY INJECTION TESTING

Primary injection testing is a useful alternative to the secondary injection methods described above. Primary injection is the true test method to verify the complete breaker overcurrent protection system including the current sensors, rating plug, and the trip unit. It involves the use of a tester, e.g. Multi-Amp Tester, to inject single phase primary current through the breaker to test the Digitrip RMS overcurrent trip system.

Notes:

1. When performing primary injection testing on breakers equipped with Ground Fault (G) protection, Trip Box Terminals G and N can be shorted together with a suitable jumper to temporarily defeat the ground fault trip function. This will enable the breaker to be tested in the Long Delay portion of the curve without tripping on ground fault. The jumper must be removed after testing to re-instate the ground fault protection on the breaker.

2. When performing primary injection testing on breakers with current limiters, the current limiters should be removed and replaced by copper shorting bars during testing. Failure to do so could result in compromising the expected performance of the current limiters. the current limiters must be re-installed after testing is completed.

## 10-5. CIRCUIT BREAKER CHECKOUT AND BENCH TEST

Before the breaker is returned to the switchgear for placement into service, the retrofit kit installation must be checked out and tested. Check all breaker retrofit wiring paths to be sure they are properly routed and free from potential interference with breaker moving parts. Confirm all wiring harness plugs are securely connected and locked into place.

Perform several breaker manual close and overcurrent trip operations. This test can be performed using any of the above described test methods. An effective installation checkout and test procedure should include the following:

1. Select and set the proper user-determined overcurrent trip settings for the Digitrip RMS Trip Unit. Verfiy the trip unit is in calibration by selecting and testing several trip points (as applicable) on the Long Delay, Short Delay, Instantaneous, and Ground Fault Time portions of the Digitrip RMS trip curve. Record the trip unit settings for perminant record and future reference.

Notes on Testing:

(1) Due to the Digitrip RMS Zone Interlocking functions, the Short Delay and Ground Fault Time trip functions will trip instantaneously, unless Digitrip RMS/R zone interlock shorting plug is placed into trip unit plug J2 to short GIN to GOUT and SIN to SOUT, see Figure 3-2. If a zone interlock shorting plug is not available and the kit is furnished with a cell terminal block assembly, GIN to GOUT and SIN to SOUT can be shorted by plugging the breaker umbilical harness into the cell terminal block assembly, e.g, see Figure 4-3, 5-3, or 6-3.

(2) Digitrip RMS has a memory circuit that simulates the time required to cool down of overloaded conductors. When performing repeated Long Delay Testing, the results may be erroneous as the memory circuit must discharge prior to the next test. The memory circuit can be discharged by disconnecting the power source (APM or 120 Vac input) to the trip unit between tests or by waiting several minutes between tests.

2. Verify the DTA properly resets as the breaker opens. The breaker will not close unless the DTA resets.

10-6 SETTING DIGITRIP RMS INCOM ADDRESS (Digitrip RMS Models 700 and 800 Only)

NOTICE

SETTING DIGITRIP RMS INCOM ADDRESS PROVIDES THE TRIP UNIT A UNIQUE IDENTIFICATION FOR COMMUNICATIONS. INCOM COMMUNICATIONS MAY BE COMPROMISED UNLESS TRIP UNIT, BREAKER, AND SWITCHGEAR CELL ARE MATCHED

Each Digitrip RMS Model 700 and 800 Trip Unit has a three dip switches that must be set to provide the trip unit with a unique address for INCOM Communications. The rating plug must be removed from the trip unit to obtain access to the dip switches. Each dip switch can be set with a small blade screwdriver from 0 - 9. The three switches have a sequence convention of top to bottom for a left to right address.

10-7 IDENTIFICATION OF TRIP UNIT, BREAKER, AND SWITCHGEAR CELL

Your Digitrip RMS Retrofit Kit includes identification labels for the Digitrip RMS Trip Unit, the breaker element faceplate, and the inside of the switchgear cell door. It is important to identify all three, especially when the trip unit has an INCOM address (Models 700 and 800 only). The labels for the breaker faceplate and the cell door are as follows:

**NOTICE**

**DIGITRIP RMS RETROFIT**

**CIRCUIT ZONE INTERLOCKS, REMOTE SIGNALS, AND/OR INCOM COMMUNICATIONS MAY BE COMPROMISED UNLESS TRIP UNIT, BREAKER, AND SWITCHGEAR CELL ARE MATCHED.**

**BREAKER ID NUMBER** _____
**SWITCHGEAR CELL ID NUMBER** _____
**TRIP UNIT CAT NO./INCOM ADDRESS** _____

**PLUG BREAKER UMBILICAL CORD INTO SWITCHGEAR CELL PLUG TO CONNECT REMOTE SIGNALS AND COMMUNICATIONS.**

PN 8187A83H01

Use stick-on Brady-type labels to complete the required label fields.

## Section 11

## Operation

11-1. Breaker Insertion and Removal

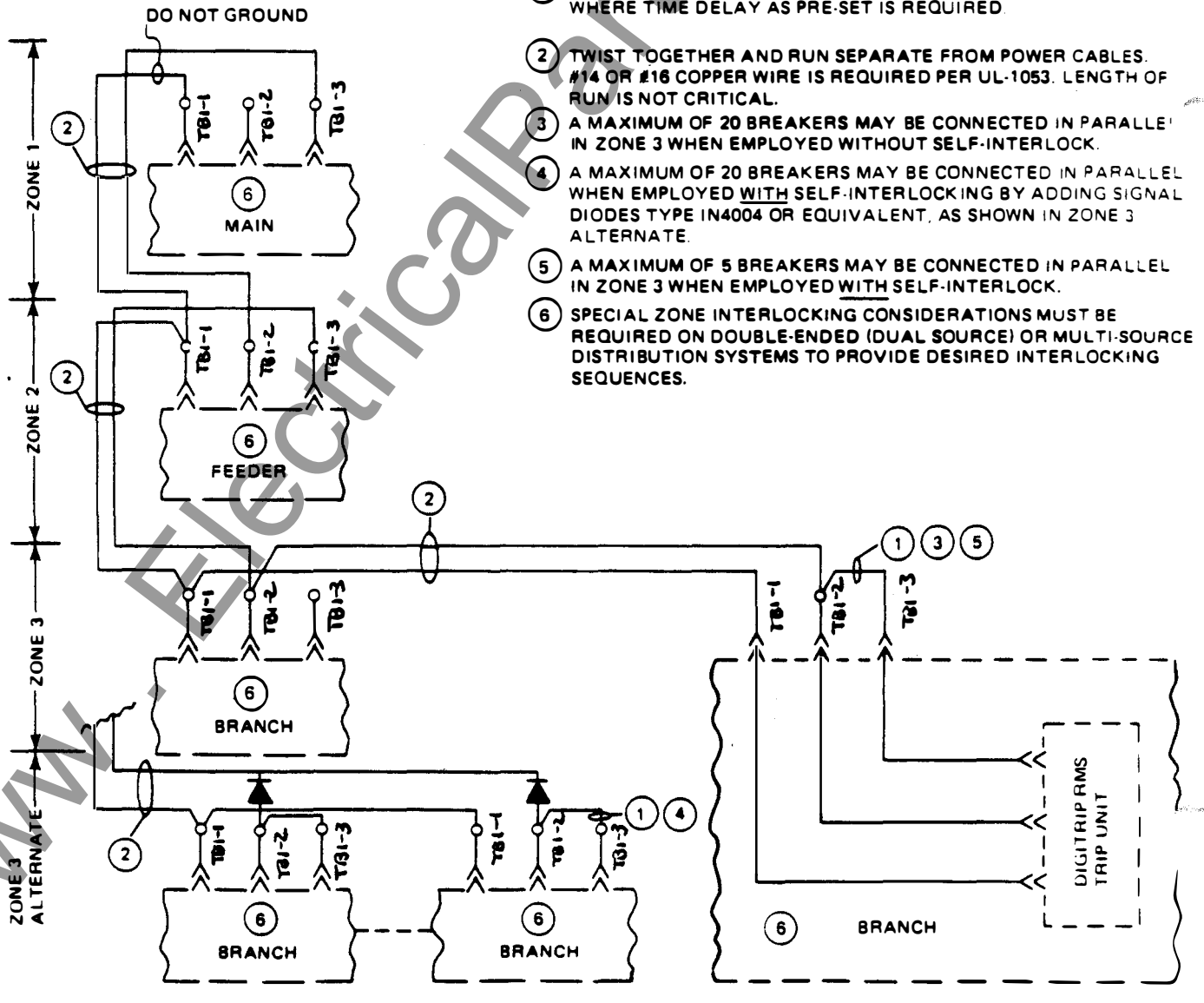
11-2. Electrical Closing Via INCOM

11-3. In the Event of a Trip

## Section 12

## Digitrip RMS Retrofit Kit Switchgear Assembly Applications

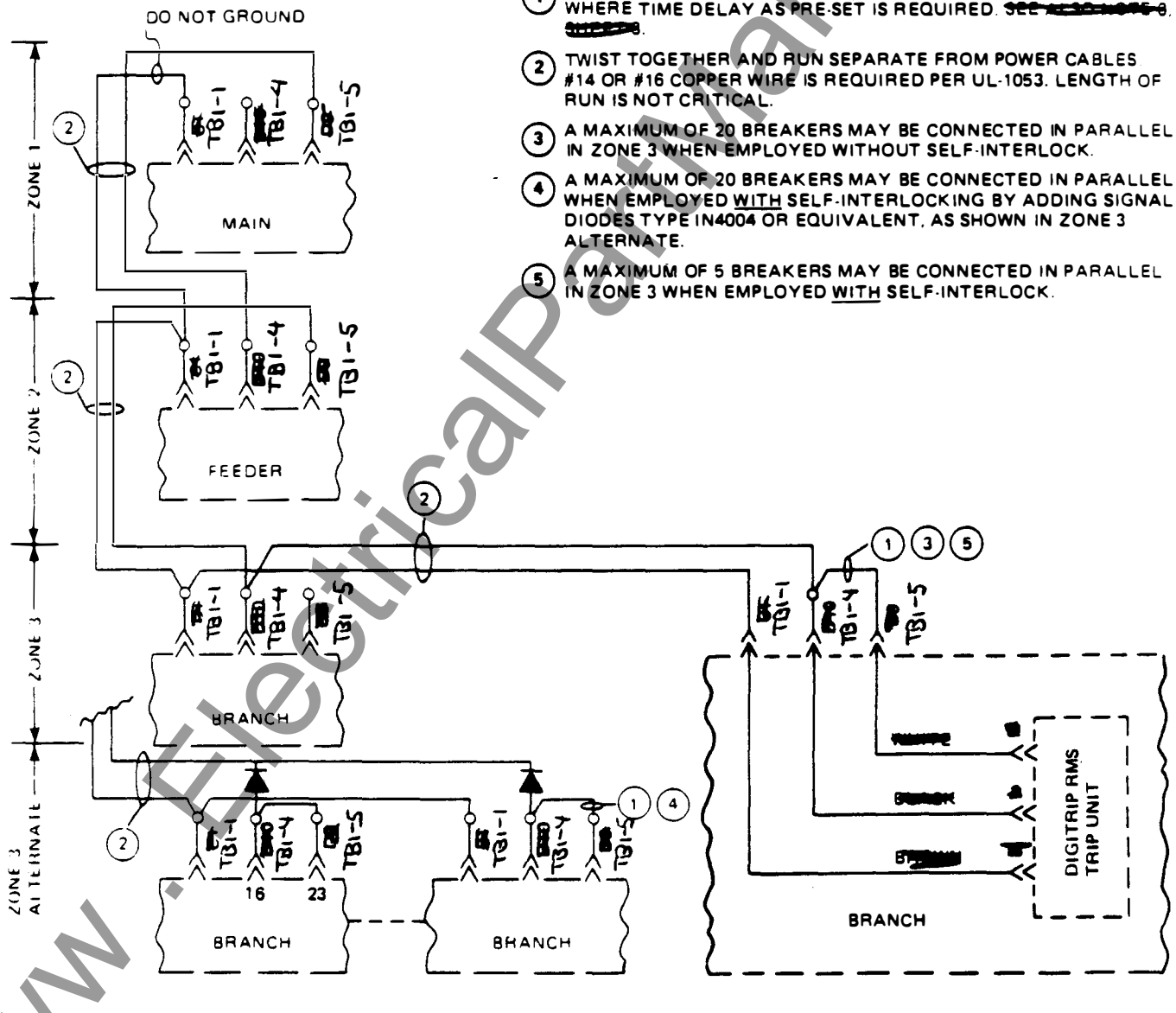
Figure 12-1
Typical Ground Fault Zone Interlocking Connections
for Radial Distribution Systems



## Figure 12-2
## Typical Short Delay Zone Interlocking Connections for Radial Distribution Systems

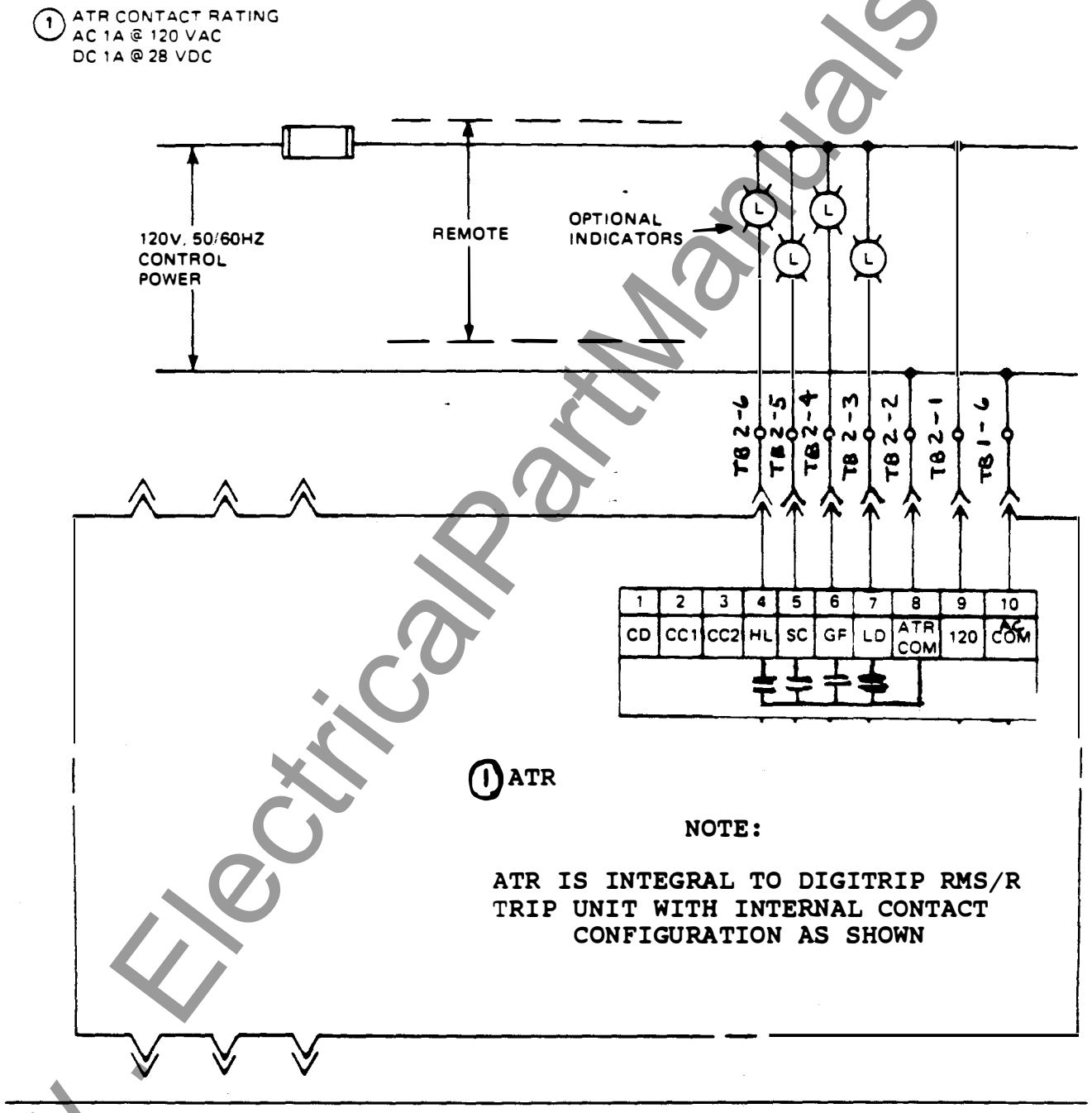
**LEGEND:**

| | | |
|---|---|---|
| TB1-1 | DG | DIGITAL GROUND |
| TB1-4 | SOUT | SHORT DELAY OUT |
| TB1-5 | SIN | SHORT DELAY IN |

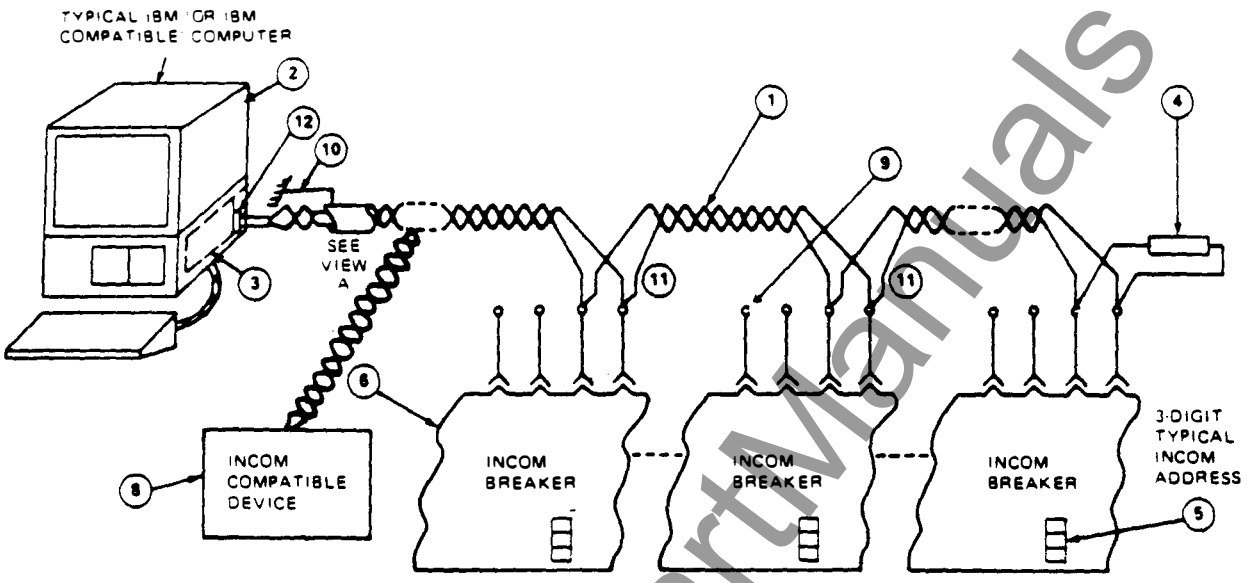



1. JUMPER MUST BE ADDED ON EACH DOWN STREAM BREAKER WHERE TIME DELAY AS PRE-SET IS REQUIRED. [redacted].
2. TWIST TOGETHER AND RUN SEPARATE FROM POWER CABLES #14 OR #16 COPPER WIRE IS REQUIRED PER UL-1053. LENGTH OF RUN IS NOT CRITICAL.
3. A MAXIMUM OF 20 BREAKERS MAY BE CONNECTED IN PARALLEL IN ZONE 3 WHEN EMPLOYED WITHOUT SELF-INTERLOCK.
4. A MAXIMUM OF 20 BREAKERS MAY BE CONNECTED IN PARALLEL WHEN EMPLOYED WITH SELF-INTERLOCKING BY ADDING SIGNAL DIODES TYPE IN4004 OR EQUIVALENT, AS SHOWN IN ZONE 3 ALTERNATE.
5. A MAXIMUM OF 5 BREAKERS MAY BE CONNECTED IN PARALLEL IN ZONE 3 WHEN EMPLOYED WITH SELF-INTERLOCK.

**Figure 12-3**
**Typical Remote ATR Alarm Connections**
**for Use With Digitrip RMS 600, 700, and 800 Retrofit Kits.**



## Figure 12-4
## Typical INCOM Network Interconnections With Master Computer for Use With Digitrip RMS 700, and 800 Retrofit Kits.




(1) FOR NETWORK INTERCONNECTIONS USE TWISTED PAIR CONDUCTORS, NO. 18 AWG SHIELDED PREFERRED.

(2) FOR THE MASTER DEVICE, USE AN IBM OR EQUIVALENT (COMPATIBLE) PERSONAL COMPUTER.

(3) A WESTINGHOUSE CONI (COMPUTER OPERATED NETWORK INTERFACE) CARD, MUST BE INSERTED INTO THE COMPUTER FRAME.

(4) A 150 OHM (1/2 WATT) CARBON COMPOSITION RESISTOR MUST BE INSTALLED ON THE MOST REMOTE CIRCUIT BREAKER TERMINALS AS SHOWN WHERE DISTANCE FROM MASTER EXCEEDS 500 FEET.

(5) A 3-DIGIT INCOM ADDRESS MUST BE PRESET ON EACH TRIP UNIT. EACH INCOM ADDRESS MUST BE UNIQUE IN THE SYSTEM. FOR INSTRUCTIONS, REFER TO I.L. 29-853 OR I.L. 29-854.

(6) FOR RETROFIT KITS, ALL CONNECTIONS AT CELL TERMINAL BLOCK ASSEMBLY

(7) FOR APPLICATION SOFTWARE, CONTACT WESTINGHOUSE.

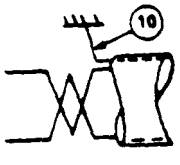
(8) CAN BE CONNECTED TO OTHER INCOM COMPATIBLE DEVICES. SEE I.L. 29-853 AND I.L. 29-854.

(8) 120 VAC INCOMING POWER CONNECTION AT TERMINALS "AC120" AND "ACCOM."

(10) GROUND SHIELDING AS SHOWN.

(11) WHERE DEVICES ARE DAISY CHAINED, INTERCONNECT SHIELDING,, INCOM CONNECTIONS AT "COMM1" AND "COMM2."

(12) MODULAR TELEPHONE CONNECTOR, TYPE RJ11, SUPPLIED BY USER.




VIEW A

# INSTALLING THE INCOM COMMUNICATIONS NETWORK

# FOR

# IMPACC SERIES III

All communications between the IMPACC System Master and INCOM compatible devices take place over the INCOM communications network. The network, consisting of a twisted pair #18 AWG cable, is originated at the System Master and is connected to every INCOM compatible device in the system.

INCOM compatible devices available at this time are:

1. PONI - Product Operated Network Interface.
2. TSF - Time Stamp Filter.
3. Addressable Relay.
4. Digitrip RMS T700 Trip Unit.
5. Digitrip RMS T800 Trip Unit.

The IQ-1000 and IQ Data Plus modules can communicate with the INCOM network through either a TSF or a PONI.

The IMPACC System Master is the "front end" of the network where all communication is initiated. Each INCOM compatible device is given a unique address; the System Master sequentially polls each device for its information. Each device will respond with its information when it has been requested by the master to do so.

Following a few rules when laying out an INCOM communications network should ensure proper operation.

**RULE 1** Up to 5 "main runs" may be connected to the System Master. Each main run may be up to 7500 feet in length.

**RULE 2** A 150 ohm, 1/2 watt end-of-line resistor (EOLR) must be placed on each main run at the last (furthest) addressable device on the run. This resistor is required to properly load the network, helping to eliminate reflected and standing waves.

**RULE 3** A "tee" may be added to the run as long as it is 200 feet or less in length. No EOLR is required for this type of tee. There is no restriction on the number of tee's per main run. Note that the tee is wired in parallel with the main run and not in series as is done with current loop systems.

RULE 4 Use shielded cable only when necessary. To prevent the INCOM network form interfering with other systems, it is recommended that the cable be shielded when it is being run in close proximity to other communication, data, computer, or telephone cabling. Shielding is not required for most normal installations or when in conduit.

## WIRING AND TERMINATION REQUIREMENTS

One of the features that makes the INCOM network easy to install is that it is not polarity dependant. No special attention need to be paid to the polarity of connections made at the System Master or the INCOM compatible devices.

### Connection to the System Master

The INCOM network is connected to the System Master via a standard RJ-11 jack located on the CONI card. Likewise, an RJ-11 jack should be mounted on the wall near the System Master. A standard 4 conductor flat telephone cable should be used to connect the two together. Make sure that this cable is connected to the proper location on the computer (other cards with RJ-11 jacks may also be there).

The twisted pair cable (or cables) going out to the INCOM Compatible devices should be connected to the BLACK and YELLOW terminals on the RJ-11 jack. A sample of this is shown in Figure 1.

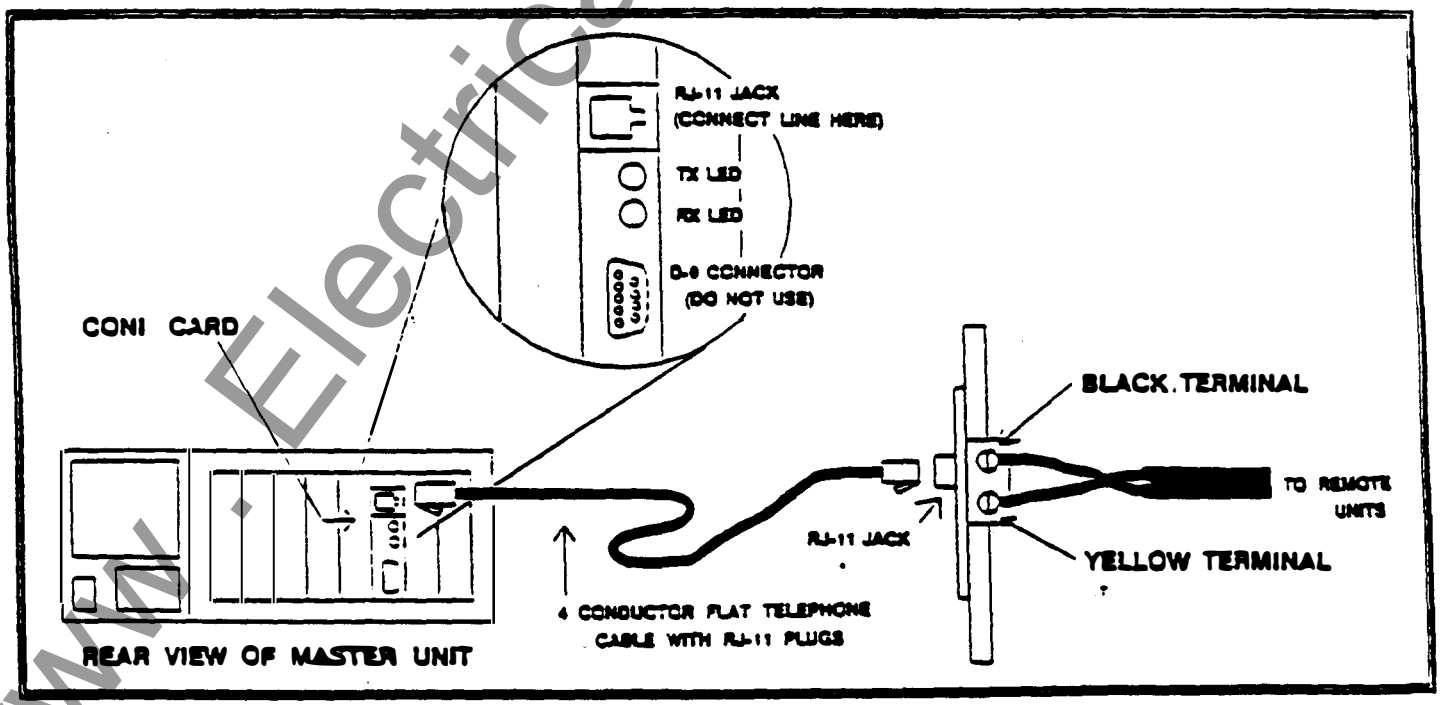



FIGURE 1

## WIRE TYPES, LENGTH AND GENERAL INFORMATION

### General Guidelines

1. All wiring is to be installed in a professional manner as per applicable codes and procedures.

2. Be sure to use properly rated wire for the various installation applications.

3. For special applications not listed, please contact Westinghouse.

### Wiring Specifications

Table 1 represents typical wire installation guidelines to be used under normal conditions. These are based on generally accepted installation methods and are not meant to conflict with any applicable codes or ordinances. If conflicts do exist for your system, please contact your Westinghouse representative before proceeding.

TABLE 1

| Function | Application | Size (AWG) | # of Cond. | Shield (Y/N) | Maximum Length | Recommended Wire Type |
|---|---|---|---|---|---|---|
| INCOM Communications Network | In Conduit (dedicated) | #18 | 2 | No | 7500 Ft. | Belden 8460 or equiv. |
| | Exposed | #18 | 2 | Yes | 7500 Ft. | Belden 8760 or equiv. |
| | Plenum | #18 | 2 | Yes | 7500 Ft. | Belden 88760 or equiv. |
| | In High Voltage Area | #18 | 2 | Yes | 7500 Ft. | Belden 9341 or equiv. |