



AUTOMATIC ENGINE CONTROLLERS MODELS A88 AND A88-F INSTALLATION MANUAL



TABLE OF CONTENTS

| SECTION | | PAGE |
|---------|---|------|
| I | INTRODUCTION | 1 |
| II | SPECIFICATIONS | 1 |
| IIA | Power Requirements | 1 |
| IIB | Input Requirements | 1 |
| IIC | Output Ratings | 1 |
| III | FRONT PANEL DESCRIPTION | 2 |
| IIIA | Description of LED Callouts | 3 |
| IIIB | Description of AOT Switch, Crank Disconnect Control & Rest/Crank Time Control | 3 |
| IV | OPTIONAL HOOKUPS | 4 |
| V | OPERATION | 5 |

LIST OF ILLUSTRATIONS

| TYPE | DESCRIPTION | PAGE |
|--------------|--|------|
| Illustration | Face Plate, A88 and A88-F | 2 |
| Illustration | Optional Hookup Schemes | 4 |
| Diagram 1 | Basic Wiring Hookup, A88 | 6 |
| Diagram 2 | A88 Wiring Harness | 7 |
| Diagram 3 | Basic Wiring Hookup, A88-F | 8 |
| Diagram 4 | A88-F Wiring Terminals | 9 |
| Diagram 5 | Wiring for Honda Generator EM3500SX/EM5000SX | 10 |
| Diagram 6 | Wiring for Honda Generator CXS360 | 11 |

In order to consistently bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time.



Frank W. Murphy Manufacturer
 P.O. Box 470248; Tulsa, Oklahoma 74147; USA
 tel. (918) 627-3550 fax (918) 664-6146
 e-mail fwmurphy@ionet.net

Frank W. Murphy Southern Division
 P.O. Box 1819; Rosenberg, Texas 77471; USA
 tel. (281) 342-0297 fax (281) 341-6006
 e-mail murphysd@intertex.net

Frank W. Murphy, Ltd.
 Church Rd.; Laverstock, Salisbury SP1 1QZ; U.K.
 tel. +44 1722 410055 fax +44 1722 410088 tlx 477088
 e-mail sales@fwmurphy.co.uk

Frank W. Murphy Pte., Ltd.
 26 Siglap Drive; Republic of Singapore 456153
 tel. +65 241-3166 fax +65 241-8382
 e-mail fwmsales@fwmurphy.com.sg

Murphek Pty., Ltd.
 1620 Hume Highway; Campbellfield, Vic 3061; Australia
 tel. +61 3 9358-5555 fax +61 3 9358-5558

Murphy de México, S.A. de C.V.
 Blvd. Antonio Rocha Cordero 300, Fracción del Aguaje
 San Luis Potosí, S.L.P.; México 78384
 tel. +52-48-206264 fax +52-48-206336
 e-mail murmexsl@sanluis.podernet.com.mx

Murphy Switch of California
 P.O. Box 900788; Palmdale, California 93590; USA
 tel. (805) 272-4700 fax (805) 947-7570
 e-mail sales@murphyswitch.com

Frank W. Murphy France
 tel. +33 1 30 762626 fax +33 1 30 763989

WARNING

BEFORE BEGINNING INSTALLATION OF THIS MURPHY PRODUCT

- ✓ **Disconnect all electrical power to the machine.**
- ✓ **Make sure the machine cannot operate during installation.**
- ✓ **Follow all safety warnings of the machine manufacturer.**
- ✓ **Read and follow all installation instructions.**

SECTION I: INTRODUCTION

A. The Automatic Engine Controller, Model A88 and A88-F is designed to automatically start, monitor and stop electric start engines. The A88 comes in an all-weather case with a 5 foot cable and a plug for connection. The A88-F is the same system, but housed in a panel-mount case with terminals on back for connecting.

B. Features

1. Has a self-contained Auto-Off-Test Switch.
2. Rest and crank time selected by a single switch.
3. Adjustable crank disconnect speed switch.
4. Close a switch to run; open to stop feature.
5. Engine starts and runs when a contact closes and stops when a separate set of contacts close.
6. Goes into a rest period in the event of a false start.
7. Alarm before start to alert personnel.

8. Crank disconnect circuitry accepts the following inputs:
 - a. breaker or electronic type ignition
 - b. magnetic pickup
 - c. alternator tach
 - d. flywheel alternator
 - e. mechanical switch
9. Has a built-in one minute time delay for customer use.
10. Five fixed crank attempts before shutdown.

SECTION II: SPECIFICATIONS

A. Power Requirements:

1. Voltage 8-30 VDC, negative ground.
2. Current @ 12 volts less load current.
 - a. standby 10 ma
 - b. crank 140 ma
 - c. shutdown 32 ma
3. Maximum fuse size, 4 amp, slow blow.

B. Input Requirements:

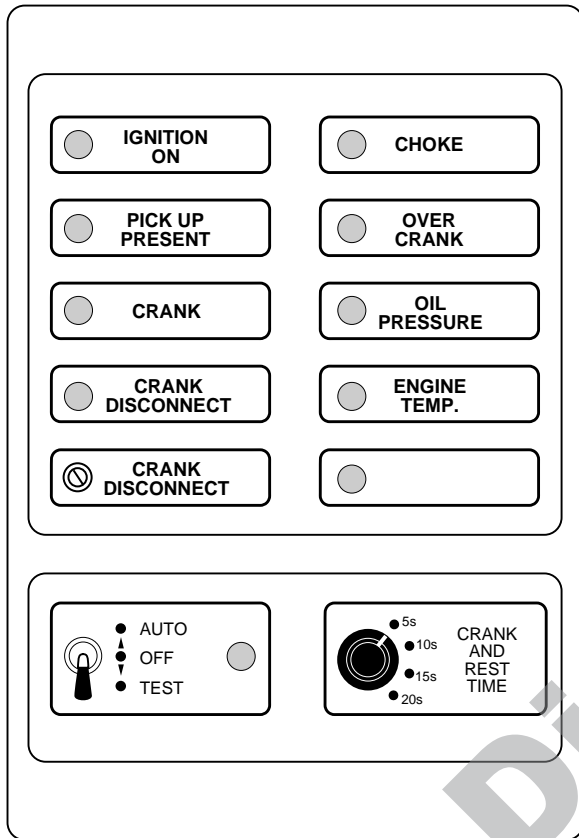
1. Start-stop control switch
 - a. SPST N.O. dry contact; close to run, open to stop
 - b. SPDT dry contact
 - c. Two SPST N.O. dry contacts; one, momentary close to run; one momentary close to stop
2. Magnetic pickup or alternator tach requirements:
 - a. voltage 2 volts, rms minimum
 - b. 25 to 2000 hz crank disconnect
 - c. maximum 100 volts Pk Pk

C. Output Ratings: Source = switch to battery Sink = switch to ground

1. Ignition or run relay; SPDT dry relay contacts rated 10 amp @ 30 VDC resistive, 6 amp @ 30 VDC inductive.
2. Crank output
 - a. transistor 1 amp source
 - b. transistor 1 amp sink
3. Choke
 - a. transistor 1 amp sink
4. Time delay
 - a. transistor 1 amp sink
5. Summary
 - a. transistor 1/2 amp sink

11. An output to indicate that the engine is running to be used as remote indication or in warm up operation.
12. Has a summary of shutdown output.
13. Monitors the following engine functions and will shut the engine down in event of a failure:
 - a. Overcrank
 - b. Oil Pressure
 - c. Engine Temperature
 - d. Spare
14. Has 30 second lockout feature for start up.
15. Output for choke actuator.

SECTION III: FRONT PANEL DESCRIPTION

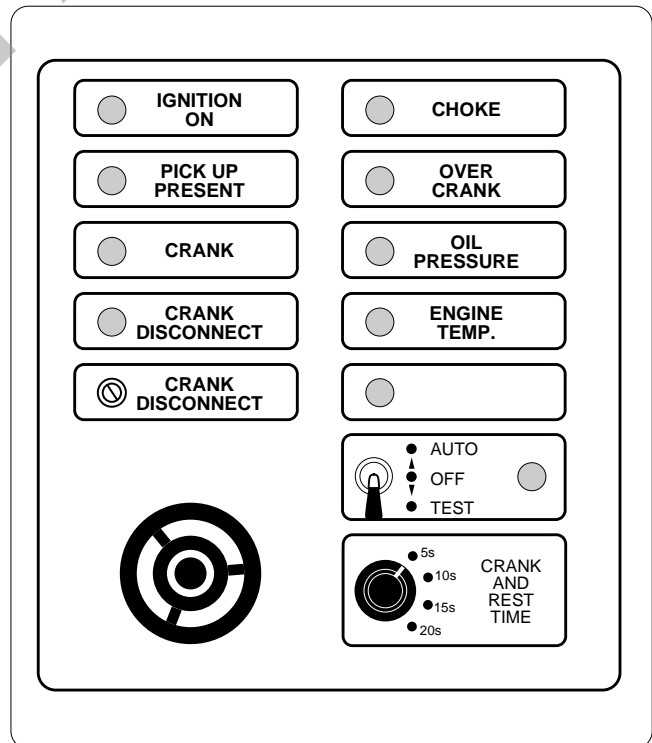


A88 Automatic Engine Controller

(Shown without enclosure)

A88-F Automatic Engine Controller

(Shown without enclosure)



FRONT PANEL DESCRIPTION

Along with each description, an attempt has been made to clarify output and input connections according to their functions and terminals or wire color.

A. Description of LED Callouts

1. IGNITION

The ignition LED will come on when the system receives a signal to start. If the alarm before start is used, this ignition LED will NOT come on until the 5 second alarm goes off.

2. PICKUP PRESENT

When the engine is cranking or running and the pickup is connected properly with sufficient output voltage (2 volt rms) this LED will come on. **IMPORTANT** - This LED must come on or the unit will not operate properly.

Note: this LED will NOT be on if a mechanical switch is used as a crank disconnect sensor.

3. CRANK

The crank LED is on when the engine is cranking and is used to show that the crank circuitry is functioning properly.

The crank solenoid will be connected to terminal 1 of the A88-F or the white/brown wire of the A88, if the solenoid is connected to positive to operate.

If the crank solenoid is grounded to operate, connect it to terminal 2 of the A88-F or connect it to the white/red wire of the A88.

4. CRANK DISCONNECT

This LED comes on when the crank disconnect adjustment is adjusted to disengage the starter. When this LED comes on, the crank LED goes out. (See item B-2 for control setting adjustments)

5. CHOKE

This LED will come on for approximately 3-4 seconds at the beginning of each crank cycle and then go out. If a choke or compression release solenoid is connected from battery positive to Terminal 3 (A88-F) or the violet wire (A88) it will be energized when the LED comes on.

6. OVERCRANK

If the engine is called on to start and fails after 5 tries, this LED will come on and stay on to indicate cause of shutdown.

7. OIL PRESSURE

The oil pressure LED will come on if oil pressure is lost during operation and remain on to indicate cause of shutdown. Terminal 11 of the A88-F or the black/white wire of the A88 are connected to the oil pressure switch.

8. ENGINE TEMPERATURE

If the unit is shutdown because of high engine temperature, this LED will be on. The temperature sensor is connected to Terminal 12 of the A88-F or the blue/white wire of the A88.

9. SPARE

This LED comes on to indicate cause of shutdown if the spare is used. Connect the monitor to Terminal 13 of the A88-F and the yellow/white wire of the A88.

Note: the overcrank, oil pressure, engine temperature and spare circuits are locked out for 30 seconds during start up. They require normally open sensors (close to operate). A summary output is available (Terminal 20 on the A88-F and the brown wire of the A88.) for remote indication when a shutdown occurs.

B. Description of AOT Switch, Crank Disconnect Control & Rest/Crank Time Control

1. AUTO-OFF-TEST

a. OFF

When a shutdown occurs, this unit must be removed from power to reset. The Auto-Off-Test switch removes power when placed in the off position. The green LED will go off. **The unit should be left off 8-10 seconds to allow the circuitry to discharge and stabilize.**

b. TEST

This position is used after all connections have been made or for periodic checks that should be a part of a preventive maintenance program. The start and stop inputs are by-passed when this switch is placed in the test position. The unit will automatically initiate the crank cycle.

c. AUTO

For normal operation and after the system has been tested, Place the switch in this position. It indicates the controller will take over starting and stopping the engine.

Note: these units may have a 4-5 second alarm before start. The A88-F comes with the alarm hooked up by connection of terminals 16 and 17. The A88 comes without the alarm hooked up; if alarm is needed, ground the red/white wire. Although it is an optional hook up, it is recommended that this alarm be used to alert personnel of a start.

2. CRANK DISCONNECT CONTROL

Adjust this control to make the crank circuit disengage the starter when the engine starts. Rotating it counter-clockwise makes the starter drop out at lower RPM.

3. REST AND CRANK TIME

By placing this switch in one of the 4 positions, the rest and crank time is selected. If the switch is placed in the 10 seconds position, the system will crank the engine for 10 seconds, then rest for 10 seconds.

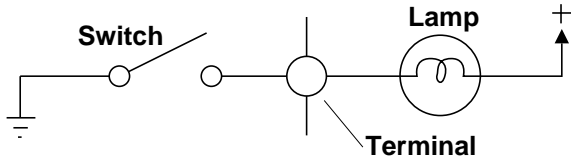
Note: if the engine starts momentarily, then dies, it will go into a 25-30 second rest period before it attempts another crank. This is regardless of what position the crank and rest switch is in.

When the system is called on to crank the first crank cycle will be typically 50% longer than the remaining four tries. This feature will aid in starting a cold engine.

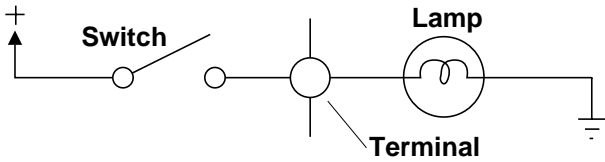
SECTION IV: OPTIONAL HOOKUPS

In this section the terms Sink and Source are used.

Sink: This term refers to an output that switches to ground to do work.



Source: This term will be used to refer to an output that is switched to positive to do work.



1. CHOKE

To use this feature, connect the choke or compression release solenoid to the battery positive and then to the terminal or wire shown:

| Output | A88-F Terminal | A88 Wire color | Output Operation | Max. Current |
|--------|----------------|----------------|------------------|--------------|
| Choke | No. 3 | Violet | Sink | 1 A |

At the beginning of each crank cycle, the choke or compression release solenoid will pull in, remain in for 3 or 4 seconds. The maximum current this circuit can carry is 1 amp.

2. SUMMARY

For a remote shutdown or alarm feature after a shutdown occurs, connect the alarm or lamp to the battery positive then to the terminal or wires shown:

| Output | A88-F Terminal | A88 Wire color | Output Operation | Max. Current |
|---------|----------------|----------------|------------------|--------------|
| Summary | No. 20 | Brown | Sink | 1/2 A |

3. CRANK CONNECTIONS

| | A88-F Terminal | A88 wire color | Connected | Output Operation | Max. Current |
|---------|----------------|----------------|----------------------|------------------|--------------|
| A Crank | No. 1 | White/Brown | Solenoid to Ground | Source | 1 A |
| B Crank | No. 2 | White/Red | Solen. to batt. pos. | Sink | |

If the crank solenoid is already connected to ground, connect to the unit as indicated in "A" above.

If the crank solenoid is already connected to the battery positive, connect it as in "B" above.

4. ENGINE RUNNING

If it is desirable to know or indicate when the engine is actually running, connect the indicator to the battery positive and then as below:

| Output | A88-F Terminal | A88 Wire color | Output Operation | Max. Current |
|----------------|----------------|----------------|--------------------------|--------------|
| Engine Running | No. 18 | Yellow | After 30 sec. delay Sink | 1 A |

After the engine has been running for approximately 30 seconds, the indicator will be energized.

5. WARM UP

If it is desirable to have a warm up period or a 90 second delay after the engine has started, connect the engine running output to the time delay input and then connect the time delay to the gas feed or clutch mechanism.

Terminal 18 to terminal 9 on the A88-F, the yellow wire to the violet/white wire on the A88 unit.

Connect the clutch or gas feed solenoid to battery positive then to the time delay output terminal 19 on the A88-F; the orange wire on the A88.

After the engine starts and has been running for approximately 90 seconds, the clutch or gas feed will be energized.

SECTION V: OPERATION

Refer to Diagrams 1 and 3: Basic Wiring Hookup for correct connections to your engine.

Diagram 2 shows wire colors that correspond to the A88 plug and hookup wire, in the event of two colors the first color is the primary color and the other is a tracer color. Diagram 4 identifies the A88-F wiring terminals.

Step No. 1, Pickup:

Determine the type of pickup to be used and connect it to the controller as illustrated in the basic wiring hookup.

Step No. 2, Starter Solenoid:

Determine the type of starter solenoid used on your engine. In most cases it will be of the source type, that is, one side of the pull in coil is connected to ground and the other has to be connected through the ignition to positive. Do not connect the controller output directly to the starter, always use a starter slave solenoid.

Step No. 3, Ignition:

The type of ignition must be determined and wired accordingly. Most later models will be of the CDI type.

Step No. 4, Start/Stop

Select the type of Start/Stop control needed and wire accordingly. If a close to run and open to stop is used be sure and connect the brown/white and the grey/white together. On the A-88-F connect terminals 16 and 17. It is recommended that the alarm before start be used for safety.

Step No. 5, Choke:

If a choke or pressure release feature is needed connect the choke solenoid to battery positive then to terminal 3 of the A-88-F or to the violet wire of the A-88.

Step No. 6, Shutdown:

Connect the shutdown circuits. The spare should be marked or labeled on the blank space.

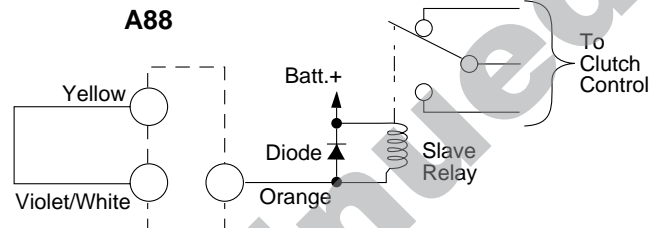
Step No. 7, Time Delay:

This system has a 60 second built-in time delay for customer use. If the appropriate inputs are grounded, it times out after the crank disconnect light comes on.

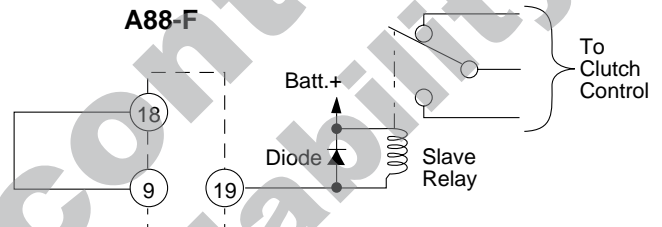
| Input | Delay | Output |
|------------------------------|------------|-----------------------------|
| A88 ground violet/white wire | 60 seconds | Orange wire Sinks to ground |
| A88-F ground Terminal 9 | 60 seconds | Terminal 19 Sinks to ground |

Step No. 8, Clutch or Warmup Operation:

If a warm up feature is desired see Section IV: Optional Hookups paragraph 5 *WARM UP*.



Clutch activates approximately 90 seconds after engine has started—pulls in after engine stops.



Clutch activates approximately 90 seconds after engine has started—pulls in after engine stops.

Step No. 9, Crank disconnect adjustment:

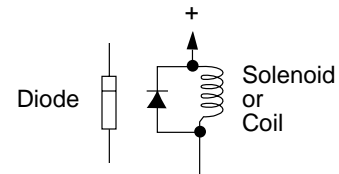
To adjust the crank disconnect, disconnect the ignition wire or leave the fuel cut off. That will let the engine crank but not start.

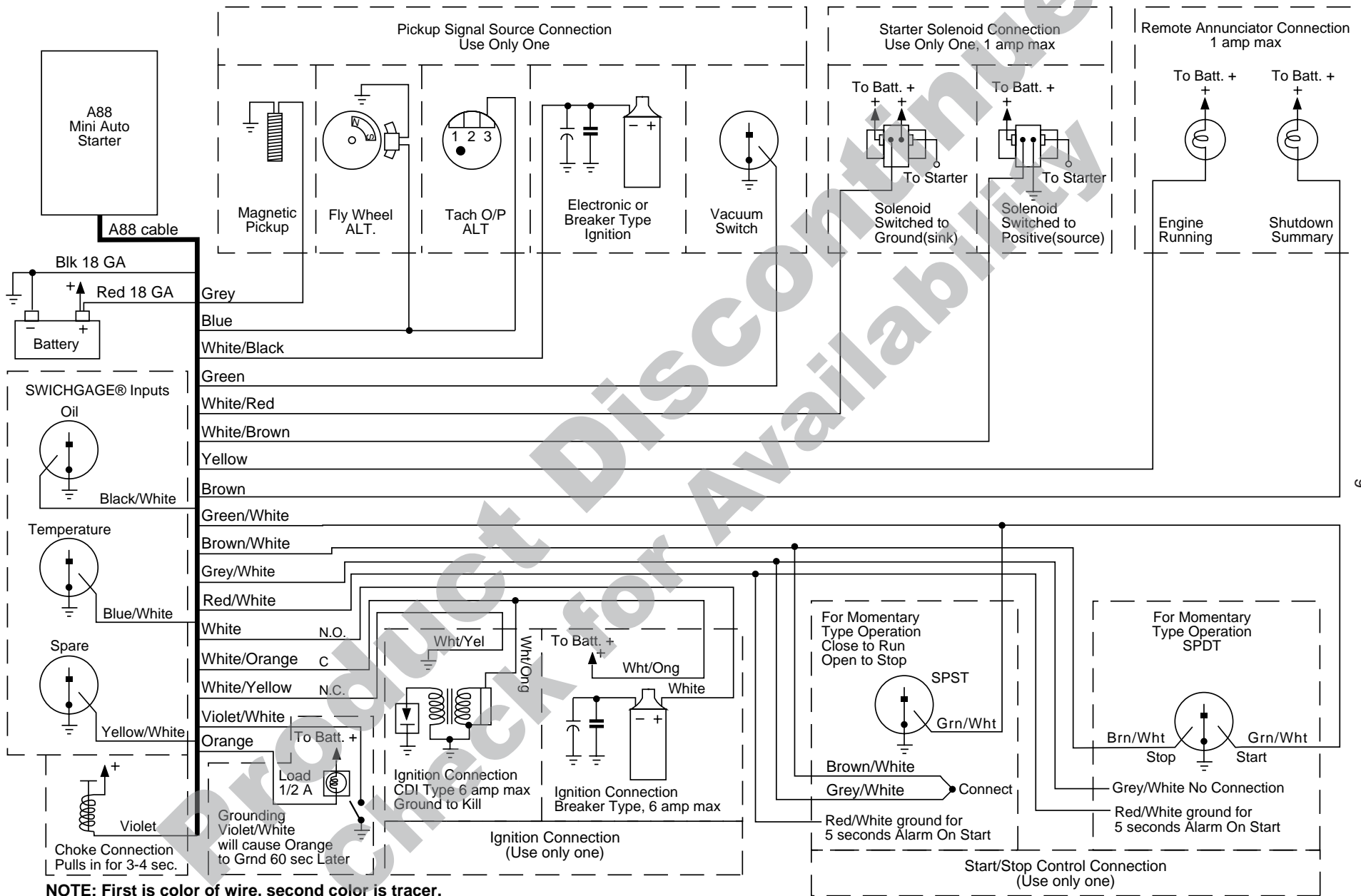
Turn the crank disconnect control fully clockwise (15 turns). This control does not have a stop and it does not hurt it to turn it more than 15 turns.

Place the the crank and rest time switch in the 10 or 15 second position. Switch the controller in the test position. With the engine cranking, rotate the control counter-clockwise until the starter drops out. Notice that the engine will crank longer the first time.

When the starter kicks out, rotate the control clockwise for approximately 1(one) turn. The crank disconnect is now set.

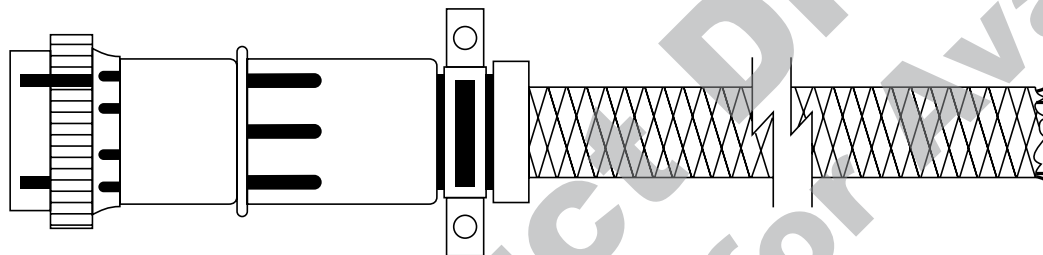
NOTE: When installing relays or solenoids that are controlled by this controller **always** install a diode directly across the coil windings to help eliminate the back EMF.





NOTE: First is color of wire, second color is tracer.
EXAMPLE: (White/Red)
 White is color, Red is trace color

Diagram 1: A88 Basic Wiring Hookup



- Pin 1-wire-Wht/Blk: Breaker ignition I/P
- Pin 2-wire-Green: Vacuum switch I/P
- Pin 3-wire-Viol/Wht: Grnd for time delay I/P
- Pin 4-wire-Grey: Magnetic pickup I/P
- Pin 5-wire-Blue: Tach alternator I/P
- Pin 6-wire-Violet: Choke (sink) O/P
- Pin 7-wire-Wht/Red: Crank (sink) O/P
- Pin 8-wire-Yellow: Engine running (sink) O/P
- Pin 9-wire-Grn/Wht: Start I/P
- Pin 10-wire-Red/Wht: Connect #11 for alarm
- Pin 11-wire-Ong/Wht: Connect #10 for alarm
- Pin 12-wire-Black: Battery negative (-)
- Pin 13-wire-Red: Battery positive (+)
- Pin 14-wire-Brn/Wht: Stop I/P
- Pin 15-wire-Grey/Wht: Connect to #14 for close to run-open to stop operation
- Pin 16-wire-Wht/Brn: Crank (source) O/P
- Pin 17-wire-Yel/Wht: Spare I/P
- Pin 18-wire-Blue/Wht: Water temp. I/P
- Pin 19-wire-Blk/Wht: Oil pressure I/P
- Pin 20-wire-Brown: Shutdown summary (sink) O/P
- Pin 21-wire-Wht/Ong: Ignition relay Common
- Pin 22-wire-White: Ignition relay N.O.
- Pin 23-wire-Wht/Yel: Ignition relay N.C.
- Pin 24-wire-Orange: Time delay (sink) O/P

Diagram 2: A88 Wiring Harness

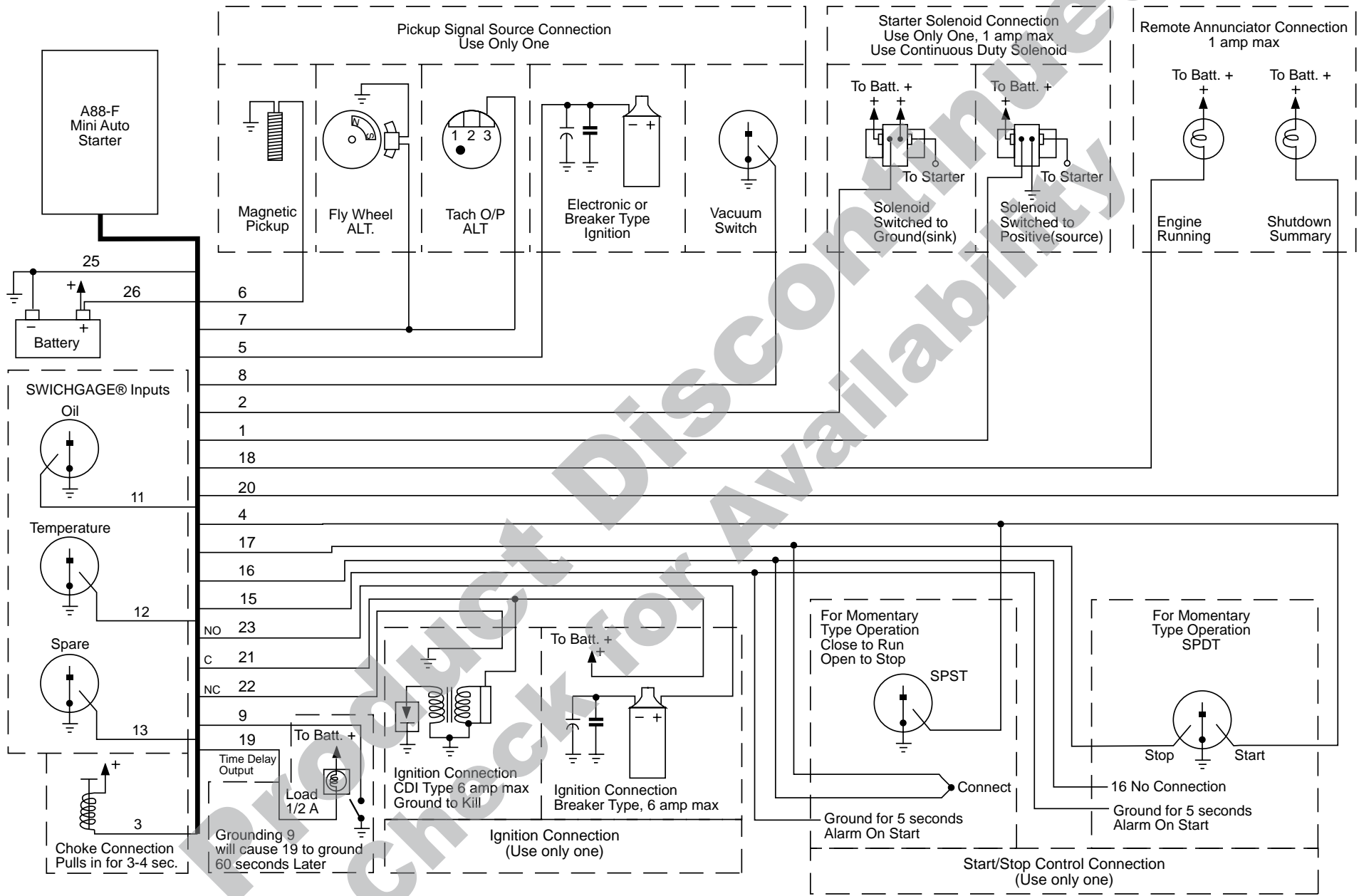
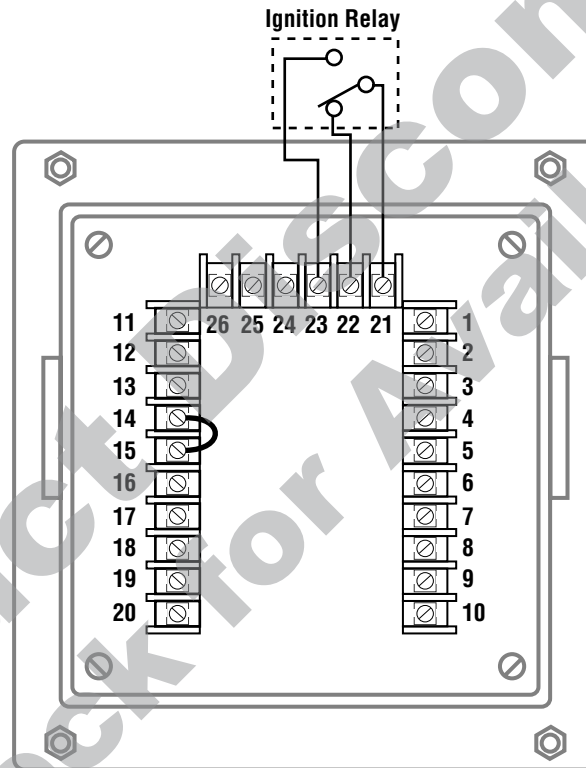


Diagram 3: A88-F Basic Wiring Hookup

- Terminal 21: Common
- Terminal 22: Normally Closed (N.C.)
- Terminal 23: Normally Open (N.O.)
- Terminal 24: No Connection
- Terminal 25: Negative (-)
- Terminal 26: Positive (+)

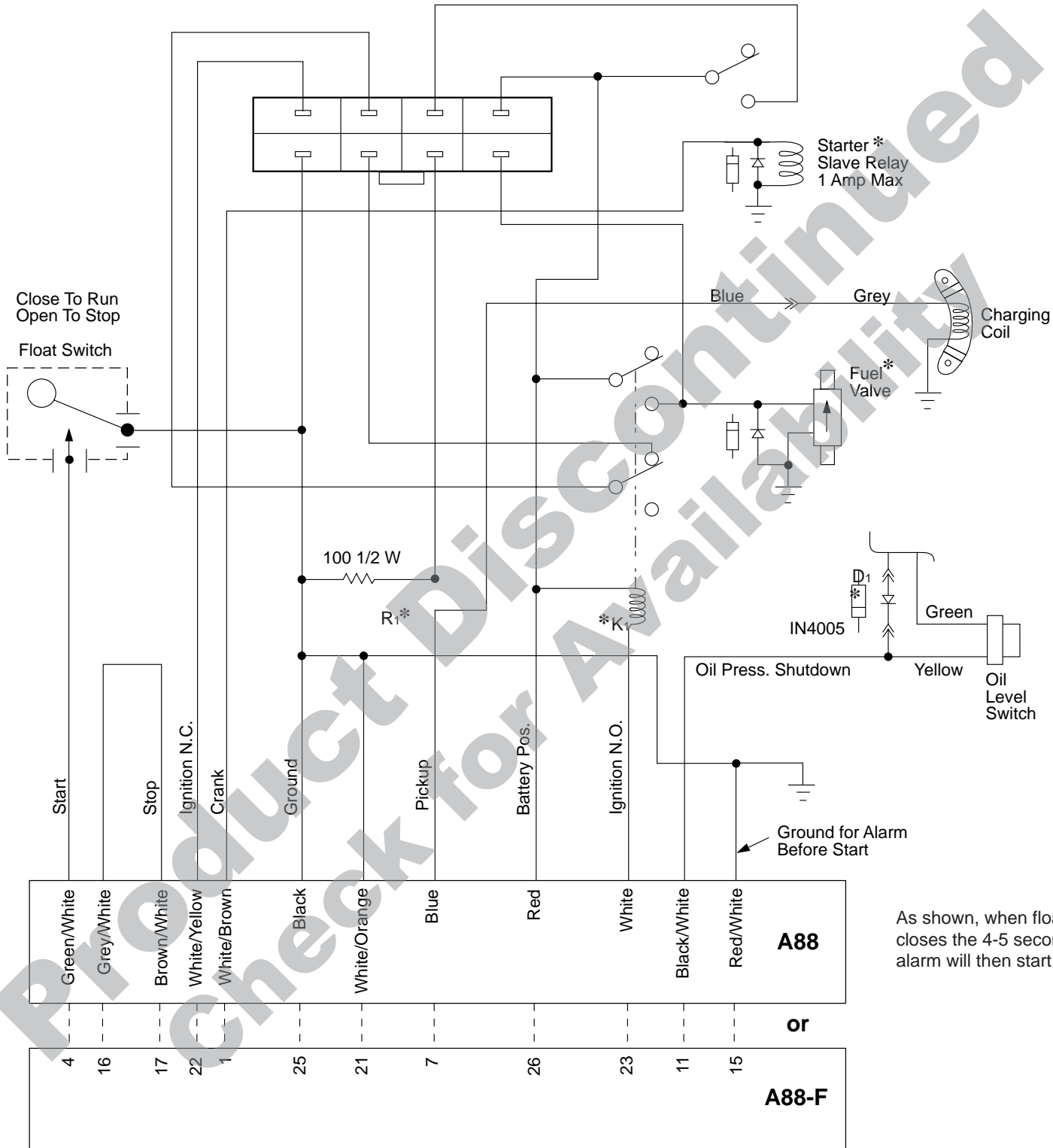
- Terminal 11: Oil pressure I/P
- Terminal 12: Water temperature I/P
- Terminal 13: Spare I/P
- Terminal 14: Jumper for alarm before start
- Terminal 15: Jumper for alarm before start
- Terminal 16: Connect to #17 for momentary operation
- Terminal 17: Stop I/P
- Terminal 18: Engine running (sink)
- Terminal 19: Time delay (sink)
- Terminal 20: Alarm summary (sink)



- Terminal 1: Crank (source)
- Terminal 2: Crank (sink)
- Terminal 3: Choke (sink)
- Terminal 4: Start I/P
- Terminal 5: Breaker ignition I/P
- Terminal 6: Magnetic pickup I/P
- Terminal 7: Alternator I/P
- Terminal 8: Vacuum switch I/P
- Terminal 9: Ground for time delay I/P
- Terminal 10: No connection

Diagram 4: A88-F Wiring Terminals

Customer Hookup for Honda Generator Model EM3500SX/EM5000SX



* Customer supplied.

Diagram 5: A88/A88-F Wiring for Honda Generator

Customer Hookup for Honda Generator Model CSX360

* Customer supplied.

** Starter solenoid or 10A 12V relay.

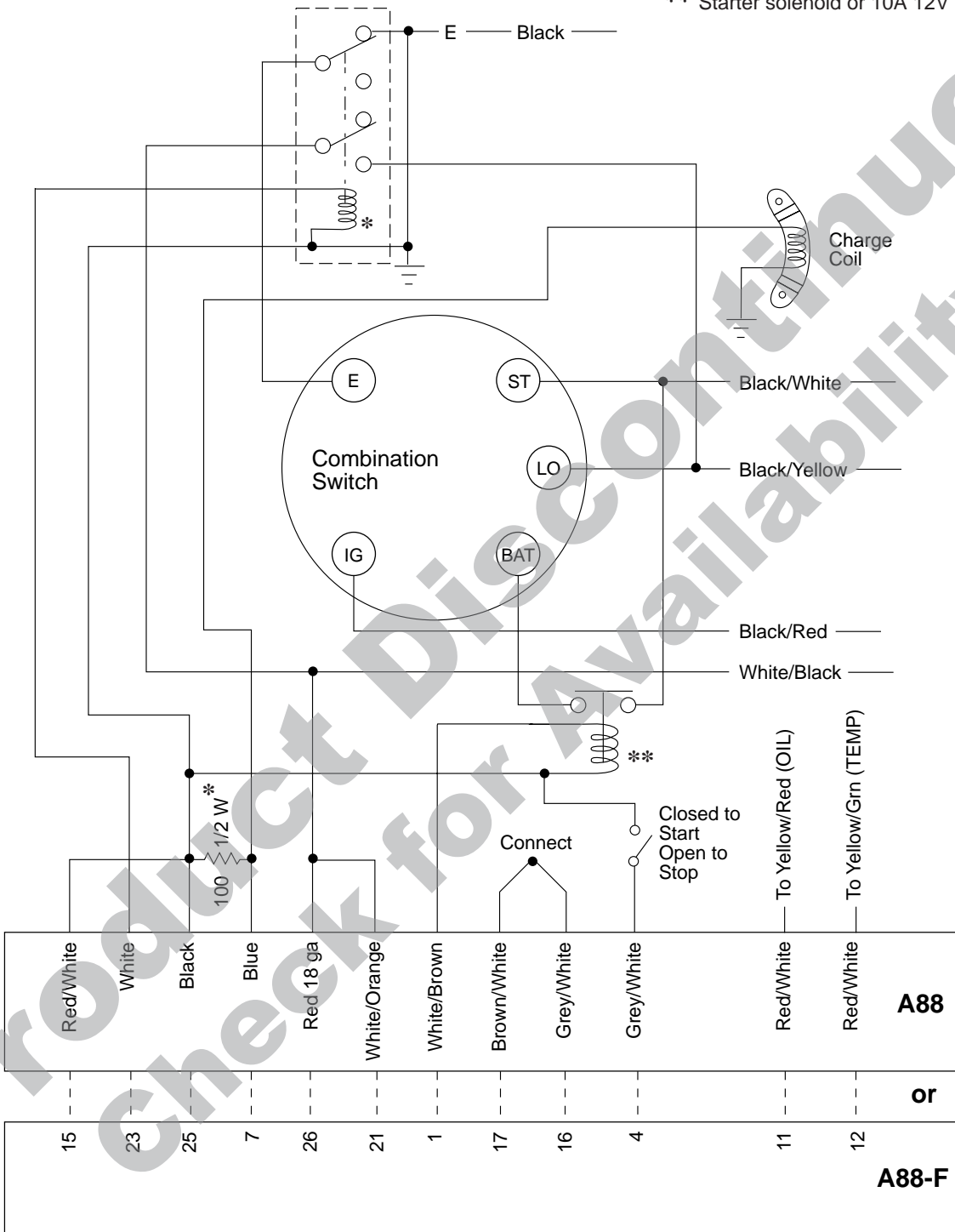


Diagram 6: A88/A88-F Wiring for Honda Generator