



INSTALLATION GUIDELINES

THOMSON TECHNOLOGY ENGINE/GENERATOR CONTROL PANELS

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1) **GENERAL INFORMATION**

NOTE

Installations should be done in accordance with all applicable electrical regulation codes as required.

The following installation guidelines for Thomson Technology engine generator control panels are provided for general information only pertaining to typical site installations. For specific site installation information, consult Thomson Technology as required. Note: Factory installations of integral control equipment that have been tested and proven may deviate from these recommendations.

CAUTION!

All installation and/or service work performed must be done by qualified personnel only. Failure to do so may cause personal injury or death.

2) **CONTROL WIRING**

As a minimum, all control wiring shall conform to the Canadian Electrical Code (CEC) Part 1. Specific wire sizes for typical circuits² (of distances up to 100ft (30m)¹) are as follows:

2.1	Battery Control Power	#10 AWG (6mm ²)
2.2	Engine Alarm/Shutdown Contacts	#14 AWG(2.5mm ²)
2.3	Remote Start Contact for Transfer Switch	#14 AWG (2.5mm ²)
2.4	Crank & Preheat Output Wiring	#10 AWG (6mm ²) (To main solenoids)
2.5	Speed Sensing Wiring	#16 AWG (1.5mm ²)-2 Conductor Shielded Cable
2.6	Metering Voltage Inputs	#14 AWG (2.5mm ²)
2.7	Metering Current Inputs (from CT's)	#10 AWG (6mm ²)

¹ For distances exceeding 100 Ft. (30m) consult THOMSON TECHNOLOGY.

² For unit mounted control panels, wire sizes may be reduced to the next smallest wire size available.

All shielded cables are recommended to be run in separate conduits to help reduce the effects of electrical noise interference (EMI/RFI etc). Note: For very short conduit runs (ie. less than 25 feet (10m) common control wiring conduits may be used.)

All AC & DC control wiring should be run in separate AC & DC conduits to help reduce the effects of electrical noise interference (EMI/RFI etc).

3) PHASE ROTATION

THOMSON TECHNOLOGY control panels are designed to accept 3 phase power systems which provide a positive or A - B - C phase rotation. Control circuits which are affected by phase rotation are as follows:

- Kilowatt meters / transducers
- KiloVar meters / transducers
- Power Factor meters / transducers
- Engine Governor Load Sharing modules
- Var/Power Factor Control modules
- Synchronizing controls
- Reverse power relays
- Negative Sequence protective relays

If a negative or C - B - A phase rotation power supply is used, the above circuits will not operate correctly. If a positive A - B - C phase rotation power system is not obtainable, consult THOMSON TECHNOLOGY for possible circuit modifications.

Note: It is the customers' responsibility to ensure a positive A - B - C is supplied to all THOMSON TECHNOLOGY control panels, unless specifically stated otherwise by contract documents.

4) **REMOTE START CONTACT FIELD WIRING**

Field wiring of a remote start contact from a transfer switch to a control panel should conform to the following guidelines to avoid possible controller malfunction and/or damage.

- a) Remote start contact wires (2 #14 AWG (2.5mm²)) should be run in a separate conduit.
- b) Avoid wiring near AC power cables to prevent pick-up of induced voltages.
- c) An interposing relay should be installed if field wiring distance is excessively long (i.e. greater than 100 feet (30m)) or remote contact has a resistance of greater than 5.0 ohms (see Fig. 1).
- d) The remote start contact must be voltage free (i.e. dry contact). The use of a "powered" contact will damage the engine controller.

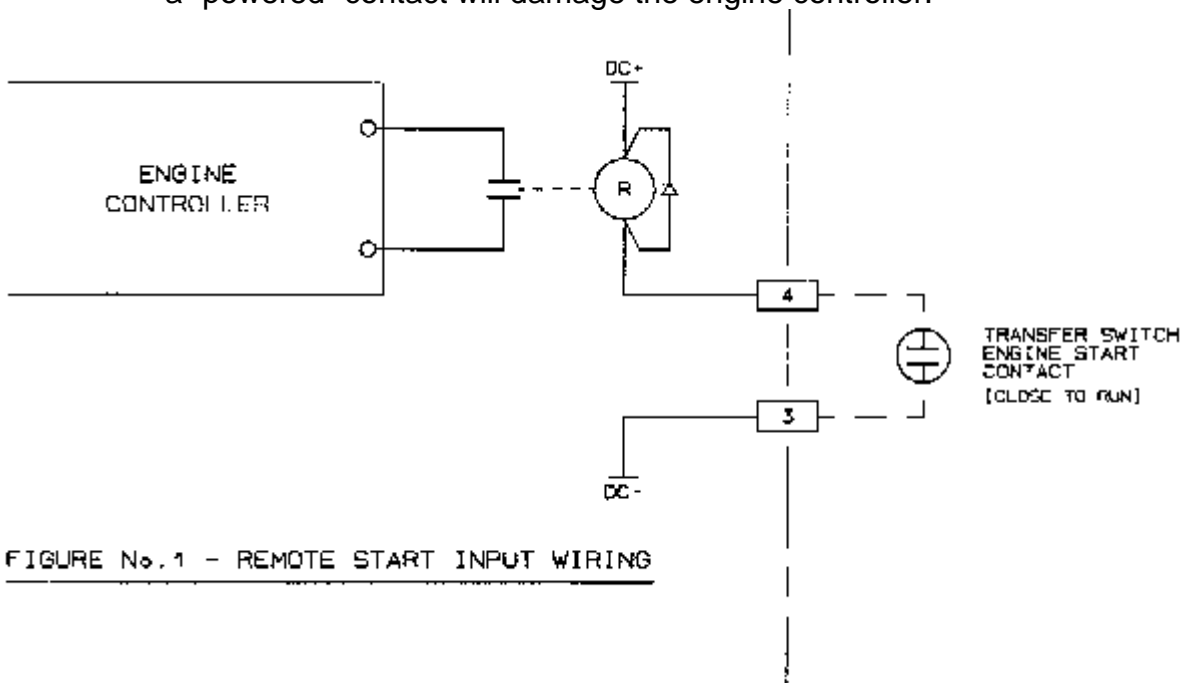


FIGURE No. 1 - REMOTE START INPUT WIRING

5) **SPEED SENSING SIGNAL WIRES**

Field wiring of the speed sensing signal wires should conform to the following guidelines to avoid possible controller malfunction and/or damage.

a) Transformer Sensing

NOTE

When transformer sensing is utilized, the voltage sensing must be connected to the line side of the generator circuit breaker (i.e. not the load side). Failure to do so will cause failure of the speed sensing circuitry if the breaker is opened.

- Avoid using system neutral conductor to prevent pick-up of harmonic voltages (i.e. use phase to phase connection for sensing).
- Avoid wiring near unrelated AC power cables to prevent pick up of induced voltages.
- Where non-linear loads represent a substantial portion of load on a generator, false operation of the controller's speed sensing network may occur in some applications if transformer sensing is used. If this problem exists, magnetic pickup speed sensing is recommended. Examples of non-linear loads would be U.P.S. systems, variable speed motors, and other devices which employ phase angle or pulse width modulated control.

b) Magnetic Pickup

- Wiring from magnetic pickup must utilize a 2 conductor shielded/twisted cable. The drain (shield) wire must be connected at the control panel end only (see Fig. 2).
- Magnetic pickup voltage at cranking speed must be greater than 3.0VAC. At nominal speed, mag pickup voltage should be between 3 - 40VAC.
- A single dedicated magnetic pickup is recommended for connection to the speed sensing input terminals. Note: One common magnetic pickup may be utilized for the system provided specific test measurements are done with the equipment installed (ie. mag pickup voltage levels meet the required levels).

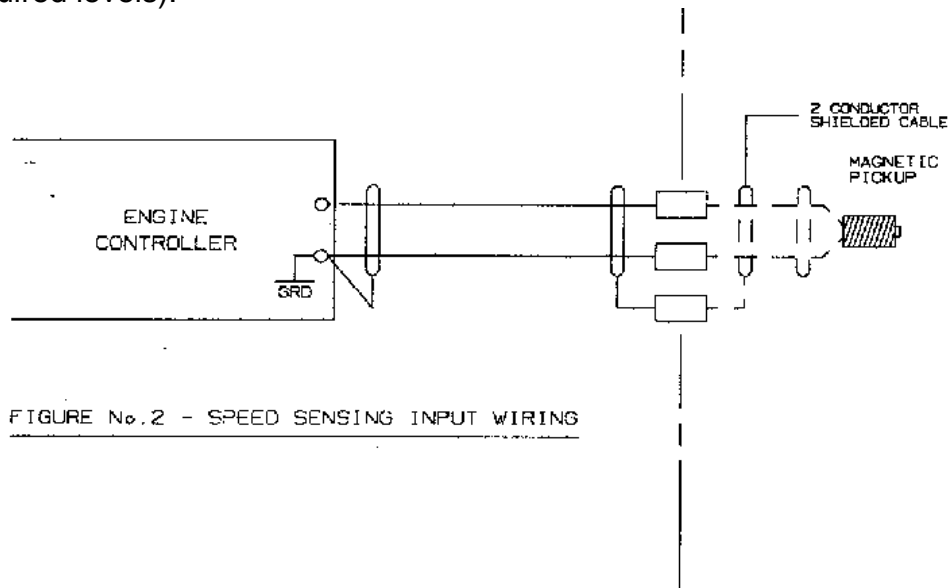


FIGURE No. 2 - SPEED SENSING INPUT WIRING

6) **BATTERY SUPPLY**

DC Power supply control wiring from the engine cranking battery to the control panel should conform to the following guidelines to avoid possible controller malfunction and/or damage.

- a) Avoid wiring from the engine starter terminals - wiring should go directly from the battery terminals to the engine control panel (to avoid voltage drop in the starter cables and starter motor commutator noise - (See Fig. 3) Note: Unit mounted control panels with short wiring runs may utilize connections from the starter terminals provided that the specific application is tested satisfactorily.
- b) Wiring from battery to engine control panel should be two - #10 AWG (6mm²) wires (i.e. do not use the engine block as one of the common conductors).
- c) Under noisy environments (i.e.. gas engines with high voltage ignitions, etc.), wiring from battery should be a twisted pair of #14 AWG (2.5mm²) wires (use #10 AWG (6mm²) wires if a DC ammeter is used).

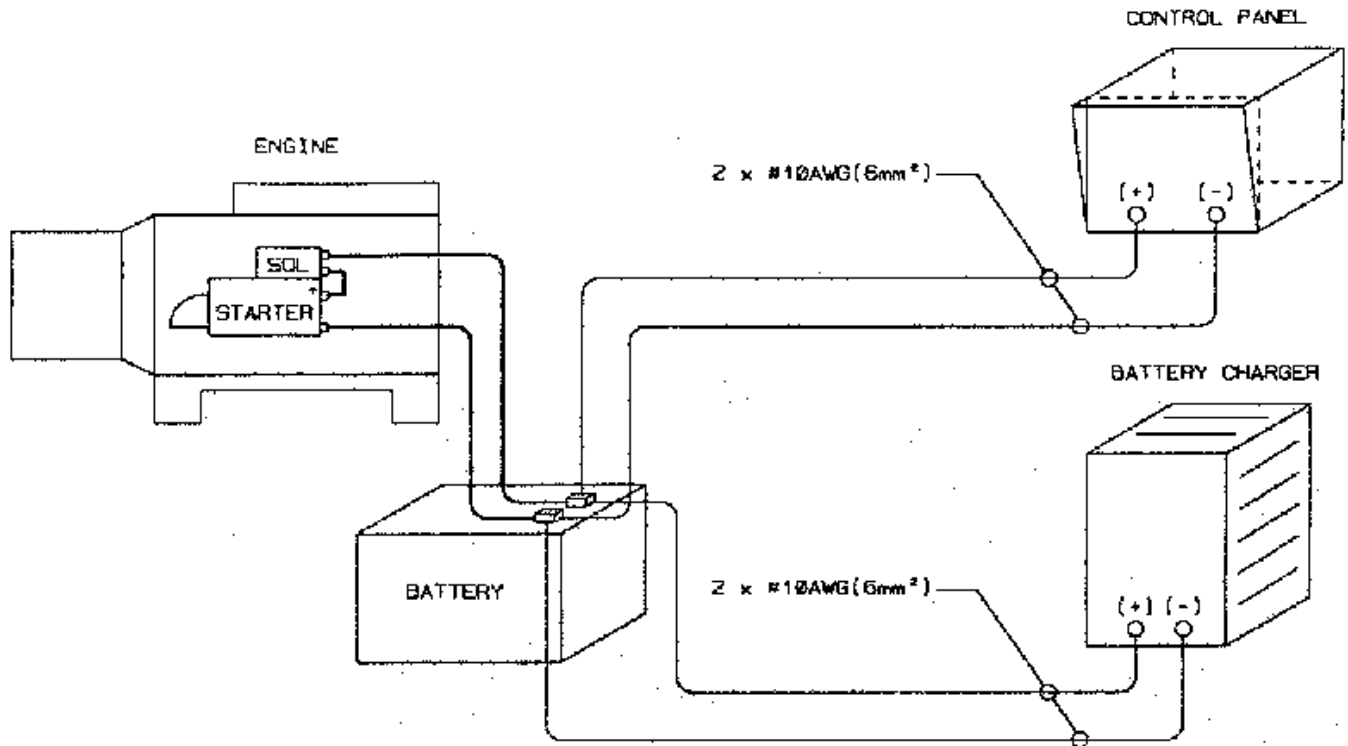


FIGURE No. 3 - BATTERY SUPPLY WIRING

7) BATTERY CHARGERS

Field wiring of an engine cranking battery charger should conform to the following guidelines to avoid possible engine controller malfunction and/or damage.

- a) Wiring from DC output of battery charger must be connected directly to the battery terminals (i.e.. not to the control panel power inputs terminals or the engine starter motor (see Fig. 3).

CAUTION!

The battery charger must be turned off before battery cables are removed from the battery (i.e.. for servicing). Failure to do so may subject the control panel to an overvoltage condition in which damage may result.

8) RELAY / SOLENOID PROTECTION

The use of AC or DC operated solenoids or relays in control systems can sometimes cause high voltage spikes on the DC power supply, which may cause electronic devices to fail.

Transient suppression devices are recommended for all inductive devices sharing wiring or if physically located near engine/generator control panels.

For DC operated relays or solenoids, use a suitably rated counter EMF Diode (or commonly known as “freewheeling” diode) (see Fig. 4).

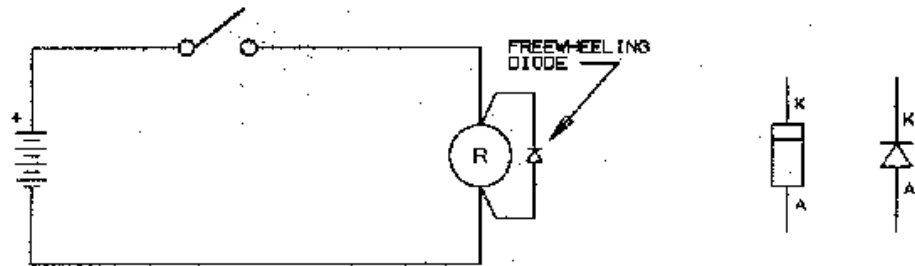


FIGURE No. 4 - DC RELAY COIL PROTECTION

For AC operated relays or solenoids, use a suitably rated metal oxide varistor (MOV) or capacitor/resistor suppressor (see Fig 5).

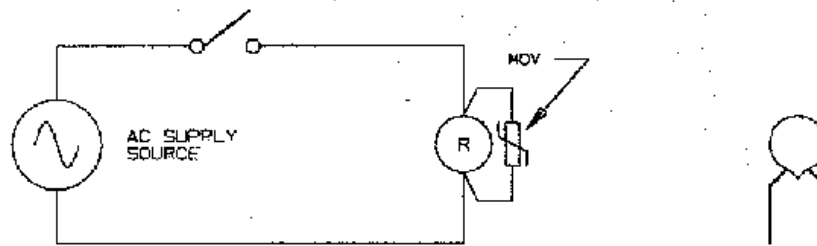


FIGURE N&.5 - AC RELAY COIL PROTECTION

9) CURRENT TRANSFORMERS

When current transformers (CT's) are used to supply ammeter circuits only, CT polarity is not critical for correct circuit operation.

When CT's are used to supply circuits utilizing 3 phase power measurement devices (such as KW meters, power factor meters, load sharing modules, reverse power relays, etc). CT polarity must be carefully observed during installation. To install CT's correctly, use the following guidelines and refer to the specific panels schematic diagrams.

CAUTION!

When installing or performing any service work on CT circuits, always de-energize the system before proceeding with any work. Never open circuit on an energized CT as extreme high voltages may result which may cause serious injury or death.

- 9.1 Install the CT with the polarity dot (white) or H1 side facing towards the supply source (see Fig. 6).
- 9.2 Connect the secondary "white" wire or terminal marked X1 or S1 to the ungrounded phase CT input terminal (typically marked C1, C2, or C3).
- 9.3 Connect the secondary "black" wire or terminal marked X2 or S2 to the grounded common CT input terminal (typically marked C0).
- 9.4 Always ensure that the power conductor phase CT matches the secondary CT wiring phase input terminal (i.e. typically - phase A CT should have its white or S1 secondary wire connected to the C1 terminal, phase B to C2, and phase C to C3. Common black wires should be connected to terminal C0).

Note: Always ensure that the corresponding voltage connections match the same phasing as the CT connections (ie. phase A voltage connection should correspond to the phase A CT and C1 secondary wiring terminal input).

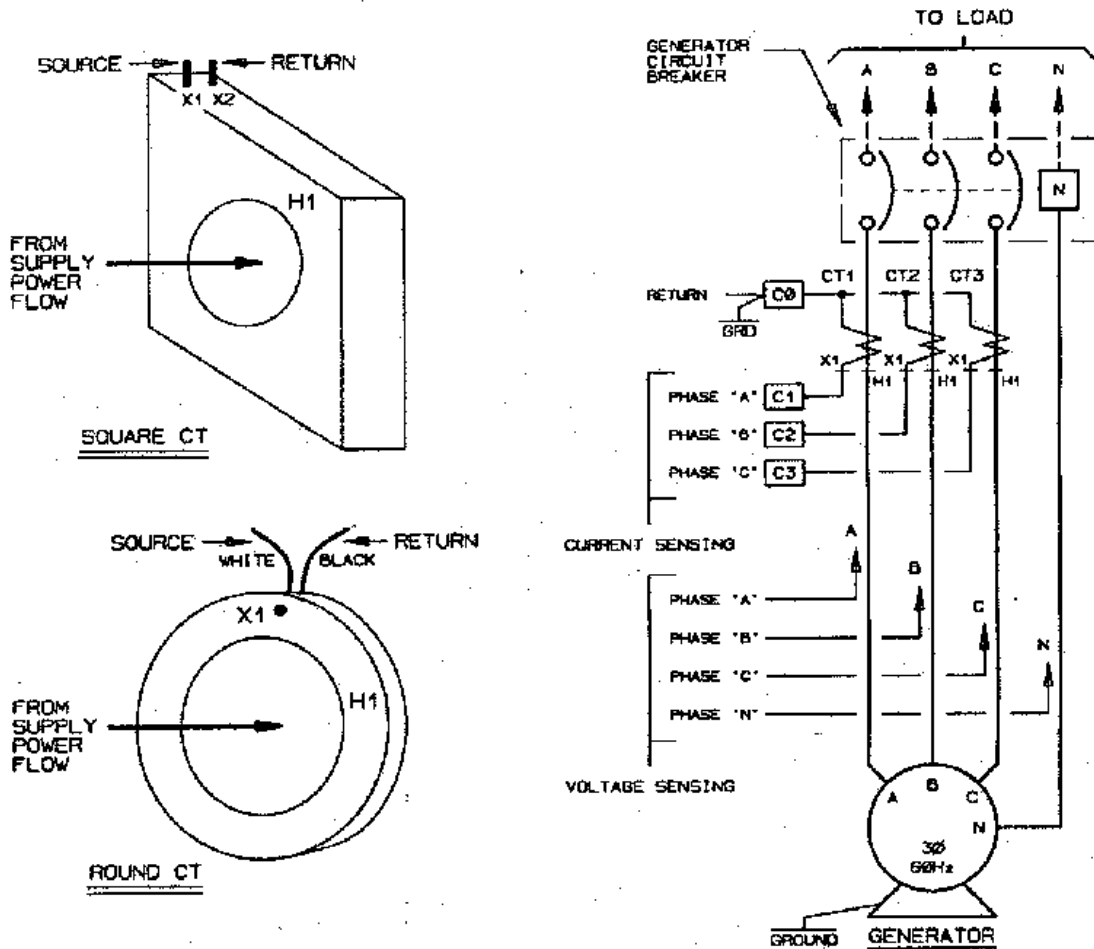


FIGURE No. 6