



Installation Manual

TWS Control



Safety Precautions

This manual includes the following symbols to indicate potentially dangerous conditions to the operator or equipment. Read the manual carefully and know when these conditions exist. Then take the necessary steps to protect personnel and the equipment.

WARNING *This symbol is used throughout the text to warn of possible injury or death.*

CAUTION *This symbol is used to warn of possible equipment damage.*

The TWS control and associated equipment have components with high voltages which present serious shock hazards. For this reason, read the following suggestions.

Always stop the generator set and disconnect the starting batteries, place the TWS control switch in STOP, and remove AC line power from associated equipment before performing maintenance or adjustments (unless specified otherwise in the instructions - then only using extreme caution due to danger of shock hazard).

Use rubber insulative mats placed on dry wood platforms over floors which are metal or concrete when working on any electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling any electrical equipment.

Jewelry is a good conductor of electricity and should be removed when working on the electrical equipment.

Do not work on this equipment when mentally or physically fatigued.

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WARNING

ONAN RECOMMENDS THAT ALL SERVICE INCLUDING INSTALLATION OF REPLACEMENT PARTS BE DONE ONLY BY PERSONS QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE. FROM THE STANDPOINT OF POSSIBLE INJURY AND/OR EQUIPMENT DAMAGE IT IS IMPERATIVE THAT THE SERVICE PERSON BE QUALIFIED.

Installation

GENERAL

The Onan TWS (three-wire start) control is a universal control compatible with all Onan three-wire start generator sets and virtually any transfer switch or remote start/stop signalling device. The control requires only a two-wire contact closure to initiate set start-up, open contact for stopping.

Two available options on the front cover are "generating" and "fault" lamps, and a running time meter. The TWS control design uses relays and wire harness, not printed circuit boards or solid state devices. All components are housed in a NEMA 1 enclosure suitable for mounting on a vertical or horizontal flat surface.

Front panel fuses (F1 and F2) are in the K4 relay coil voltage sensing circuit. If a fuse is open, the generator set will run for about one minute, then shut down and turn the fault lamp on. If a fuse needs replacement, use an exact replacement only (0.25 in. x 1.25 in. [6 mm x 32 mm] cartridge, rated 0.5 ampere 250 VAC). Be sure all power is removed before removing fuses.

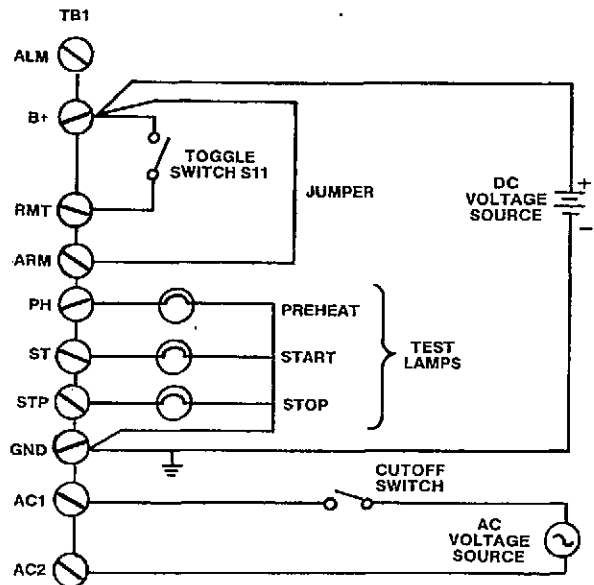
WARNING Contact with high voltage in the TWS control when the generator set is running might cause serious personal injury or death. Shut down the generator set and disconnect the starting battery cable before removing the fuses.

Prior to installation, the TWS control time delay adjustments must be set. This can be done as a bench test by the installer before going to the installation site.

TIME DELAY ADJUSTMENT PROCEDURE

WARNING Some terminals within the control present a shock hazard which might cause serious personal injury or death. For this reason, stay clear of exposed terminals when making adjustments to control.

Relays K2 and K3 are adjustable time delay relays on the relay mounting bracket assembly (Figure 2). The time delay controls R1 and R2 are factory set for maximum delay. Consult the appropriate generator set Operator's Manual for preheat time delay settings. The glow plugs are also energized during engine cranking. Bench adjust and test the TWS control with the hookup shown in Figure 1 and the following procedure.



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FIGURE 1. BENCH TEST HOOKUP

Equipment Required:

- A 12- or 24-volt DC source as required, 15 VA minimum
- A 120- or 240-volt AC source as required, 10 VA minimum, with cutoff switch (SPST)
- Three test lamps, 12- or 24-volt as required
- Toggle switch S11 (SPST)
- Stopwatch

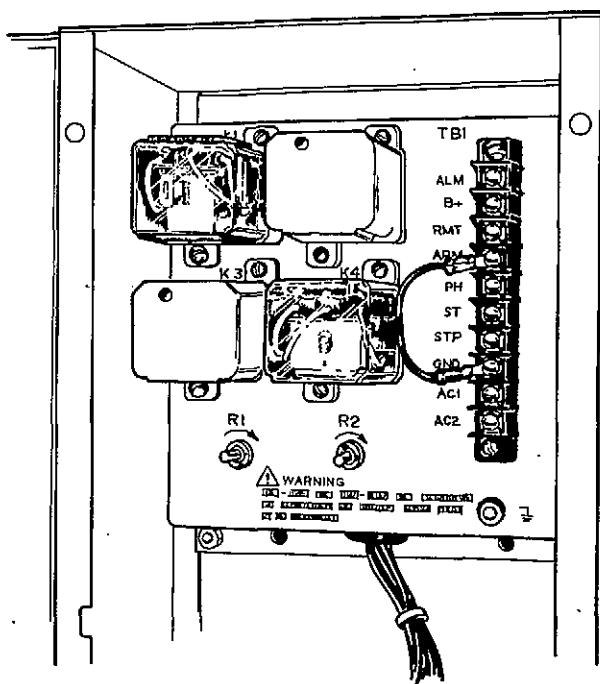
1. Make connections to TB1 on the relay mounting bracket as shown in Figure 1.
2. Place the TWS Auto-Handcrank-Stop switch (S1) in the Auto position. The Stop test lamp should light.
3. Close toggle switch S11. The Preheat test lamp should come on.

4. After the Preheat delay the Start test lamp should come on, and the Stop test lamp go off. The Preheat test lamp should remain lit.

This delay period is the Preheat time, or the start delay time for those units not requiring preheat. To reduce this delay period, turn time delay control R1 counterclockwise. R1 is linear to allow an estimated course setting. Check accuracy of setting by repeating Steps 2 through 4 and measure time with the stopwatch. Adjust R1 as necessary for desired time delay.

5. After the fail to start delay, the Preheat and Start test lamps should go off. The Stop test lamp and the TWS control FAULT lamp (when used) should light. Check for B+ voltage at the TB1-ALM terminal.

This delay period is the overcrank or fail-to-start time delay. If the engine fails to start, or the generator fails to produce voltage, the TWS control will stop the engine and turn on the FAULT LAMP (when used). Fault reset is done automatically when the remote start signal is removed.



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FIGURE 2. RELAY MOUNTING BRACKET ASSEMBLY

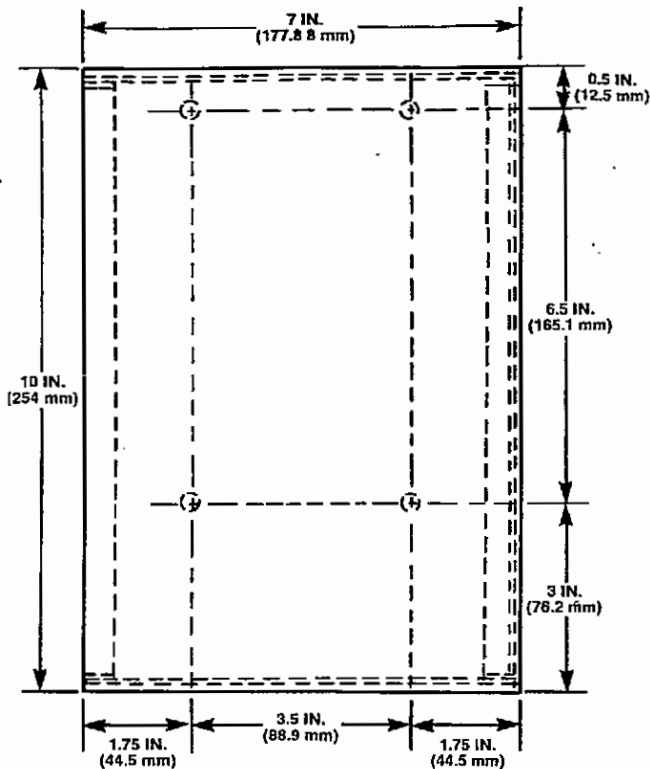
To reduce this delay period, turn time delay control R2 counterclockwise. R2 is linear to allow an estimated course setting. Check accuracy of setting by repeating Steps 2 through 5 and measure time with the stopwatch. Adjust R2 as necessary until the desired time between switching on and off of the Start test lamp is achieved.

6. Perform Steps 2, 3 and 4. After the Start test lamp comes on, close the AC voltage cutoff switch. The Start and Preheat test lamps should switch off and the TWS control Generating lamp should light (when used). The running time meter should be operational (when used).
7. Open toggle switch S11 and AC source cutoff switch. The Stop test lamp should light.
8. Place the Auto-Handcrank-Stop switch in Handcrank position. The Stop test lamp should switch off.
9. Close toggle switch S11 and verify that the start function does not occur (Preheat and Start lamps do not light). Then momentarily hold the Auto-Handcrank-Stop switch in Stop position. The Stop test lamp should light momentarily.
10. Preheat delay settings must be checked again after installation due to decreased battery voltage. Recheck time delay with preheaters energized and decrease setting to specification, as required.

LOCATION AND MOUNTING

WARNING *The ignition of explosive fumes or gases can result in severe personal injury or death. Do not install the control with shipboard-installed marine generator sets in compartments which are not ventilated, in engine rooms, or storage battery compartments. Minor sparking of control relay contacts can ignite any explosive gases in the atmosphere.*

The TWS control can be mounted on a flat surface in any position. Areas for mounting might include a wall, load transfer cabinet panel, generator set control housing, etc. Figure 3 shows the mounting hole dimensions of the control.



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FIGURE 3. MOUNTING DIMENSIONS

Place the control in the selected mounting position, open control door and mark location of mounting holes. Drill four mounting holes and mount control securely.

WIRING

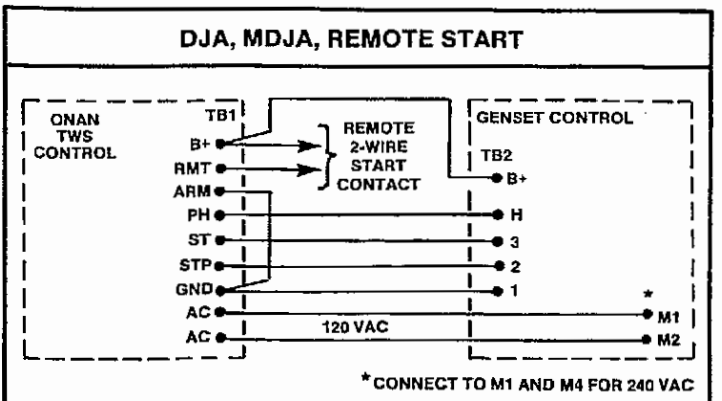
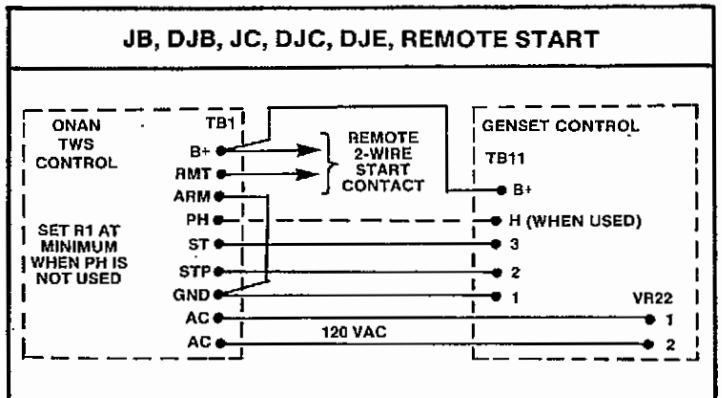
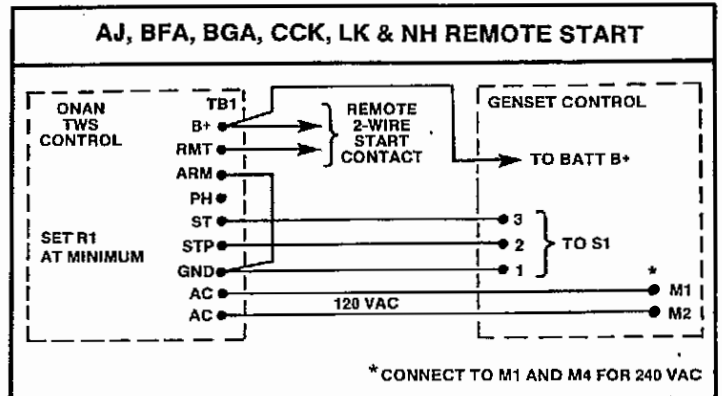
WARNING Contact with voltages within the transfer switch or from the generator set presents a shock hazard and might cause serious personal injury or death. Disconnect AC voltage from the transfer switch and disconnect starting battery on the generator set before proceeding with wiring.

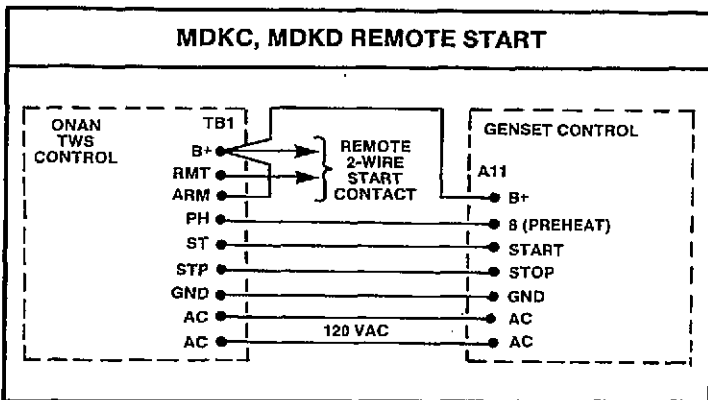
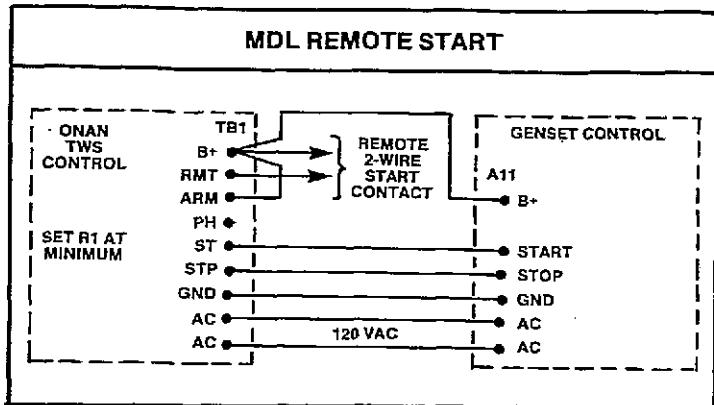
All wiring must be performed only by qualified personnel following applicable electrical codes.

Use 16 gauge wire size (minimum) for distances up to 50 feet (15.2 m). The circuit resistance reading (to and from combined) should not exceed 100 milliohms. A 3/4 inch (19 mm) knockout is provided in the cabinet bottom for connecting conduit. The B+ wiring and AC wiring from the generator can be run in the same conduit.

The following interconnection wiring diagrams are listed by model series. Use the appropriate diagram and instructions. The TWS control wire jumper on terminal TB1-ARM must be connected to:

- TB1-B+ for generator sets using 3-wire switched B+ start/stop signals.
- TB1-GND for generator sets using 3-wire switched ground start/stop signals.





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BONDING

A bonding stud is provided inside the control box for use in bonding the enclosure to a suitable earth ground. The stud consists of a steel, round head 8-32 machine screw with suitable nuts and shake washers to ensure positive metal-to-metal contact.

CLEANING OF CABINET

After mounting and wiring of the TWS control are completed, clean the interior with a vacuum cleaner to remove any chips, filings, or dirt from the cabinet interior and components.

CHECKOUT PROCEDURE

After installing the TWS control, perform the following checkout procedure.

1. Place the TWS control toggle switch in the H.C. (hand crank) position.
2. Connect starting battery to the generator set.
3. The generator set can be started at its control, but not by actuation of the remote 2-wire start contact.
4. Place the TWS control toggle switch in the Auto position. If the remote 2-wire start contact is closed, the TWS control will initiate start sequence of the generator set.
5. Recheck timing of preheat function (if applicable) and start disconnect/alarm functions. These settings were "bench tested" prior to installation and should not have changed.

Be sure that a copy of the Operator's Instructions 900-0241 is left with the operator.



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