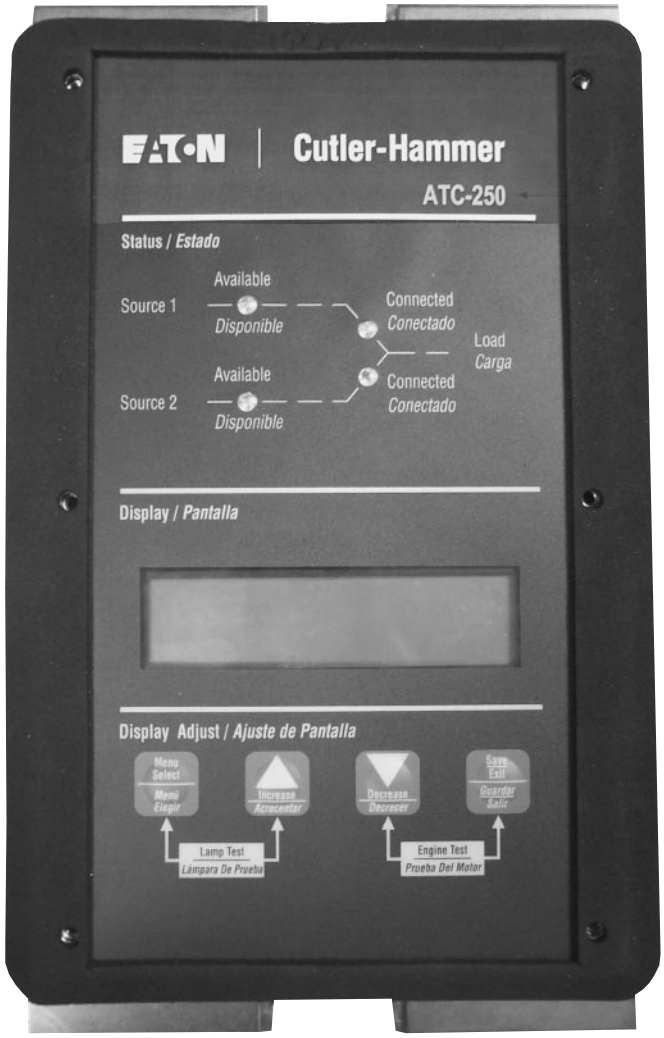
EATON | Cutler-Hammer

O & M Manual for the ATC-250 Automatic Transfer Switch Controller

Instruction Book
Effective April 2003



For more information visit: www.cutler-hammer.eaton.com

CAUTION

THE ATC-250 IS FACTORY PROGRAMMED FOR A SPECIFIC TRANSFER SWITCH. DO NOT ATTEMPT TO INTERCHANGE ATC-250 CONTROL DEVICES WITHOUT CONSULTING THE FACTORY.

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding this particular installation, operation or maintenance of this equipment, the local Cutler-Hammer representative should be contacted.

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SECTION 1: INTRODUCTION

1.1 PRELIMINARY COMMENTS AND SAFETY PRECAUTIONS

This technical document is intended to cover most aspects associated with the installation, application, operation and maintenance of the ATC-250 Controller. It is provided as a guide for authorized and qualified personnel only in the selection and application of the ATC-250 Controller. Please refer to the specific WARNING and CAUTION in Section 1.1.2 before proceeding. If further information is required by the purchaser regarding a particular installation, application or maintenance activity, a Cutler-Hammer representative should be contacted.

1.1.1 WARRANTY AND LIABILITY INFORMATION

NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OF MERCHANTABILITY, OR WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE, ARE MADE REGARDING THE INFORMATION, RECOMMENDATIONS AND DESCRIPTIONS CONTAINED HEREIN. In no event will Cutler-Hammer be responsible to the purchaser or user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment, plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities, or claims against the purchaser or user by its customers resulting from the use of the information and descriptions contained herein.

1.1.2 SAFETY PRECAUTIONS

All safety codes, safety standards and/or regulations must be strictly observed in the installation, operation and maintenance of this device.

WARNING

THE WARNINGS AND CAUTIONS INCLUDED AS PART OF THE PROCEDURAL STEPS IN THIS DOCUMENT ARE FOR PERSONNEL SAFETY AND PROTECTION OF EQUIPMENT FROM DAMAGE. AN EXAMPLE OF A TYPICAL WARNING LABEL HEADING IS SHOWN ABOVE TO FAMILIARIZE PERSONNEL WITH THE STYLE OF PRESENTATION. THIS WILL HELP TO INSURE THAT PERSONNEL ARE ALERT TO WARNINGS, WHICH APPEAR THROUGHOUT THE DOCUMENT. IN ADDITION, CAUTIONS ARE ALL UPPER CASE AND BOLDFACE AS SHOWN BELOW.

CAUTION

COMPLETELY READ AND UNDERSTAND THE MATERIAL PRESENTED IN THIS DOCUMENT BEFORE ATTEMPTING INSTALLATION, OPERATION OR APPLICATION OF THE EQUIPMENT. ANY WIRING INSTRUCTIONS PRESENTED IN THIS DOCUMENT MUST BE FOLLOWED PRECISELY. FAILURE TO DO SO COULD CAUSE PERMANENT EQUIPMENT DAMAGE.

1.2 BACKGROUND

Transfer switches are used to protect critical electrical loads against loss of power. The load's normal power source is backed up by a secondary (emergency) power source. A transfer switch is connected to both the normal and emergency sources and supplies the load with power from one of these two sources. In the event that power is lost from the normal source, the transfer switch transfers the load to the secondary source. Transfer can be automatic or manual, depending upon the type of transfer switch equipment being used. Once normal power is restored, the load is transfered back to the normal power source.

In automatic transfer switch equipment, the switch's intelligence system initiates the transfer when normal power falls below a preset voltage. If the emergency source is a standby generator, the transfer switch initiates generator starting and transfers to the emergency source when sufficient generator voltage is available. When normal power is restored, the transfer switch automatically transfers back and initiates engine shutdown.

An automatic transfer switch consists of three basic elements:

1. Main contacts to connect and disconnect the load to and from the source of power.

2. A transfer mechanism to affect the transfer of the main contacts from source to source.

3. Intelligence/supervisory circuits to constantly monitor the condition of the power sources and thus provide the intelligence necessary for the switch and related circuit operation.

This manual deals with the third basic element of the automatic transfer switch, the required intelligence/supervisory circuits. Prior to the introduction of ATC-250 Controller, this function was performed by the ATC-200.

1.3 PRODUCT OVERVIEW

The ATC-250 Controller is a comprehensive, multi-function, microprocessor based automatic transfer switch controller. It is a compact, self-contained, panel mounted device designed to replace traditional relay and solid state logic panels.

Designed to meet the needs of markets worldwide, the ATC-250 Controller:

- Is a UL Recognized Component
- Complies with UL 1008/CSA 178.22
- Meets Intent of UL 991
- Meets IEC 1000-2, 3, 4, 4-6, 4-11 and 5
- Meets CISPR 11
- Complies with FCC Part 15, Class A

The ATC-250 Controller provides an unmatched degree of programmed flexibility to address the needs of any system. It operates with all system voltages from 120 VAC to 240 VAC at 50 or 60 Hz. In addition, a period of no control power operation is provided. The ATC-250 Controller is capable of monitoring the condition of the 3-phase line-to-line voltage and frequency of both the Normal and Emergency Sources. It can also be programmed for single phase operation. The ATC-250 Controller provides the necessary intelligence to insure that the switch operates properly through a series of programmed sensing and timing functions.

A standard ATC-250 Controller will:

- Monitor Normal and Emergency Source voltage as well as Energency frequency
- Provide undervoltage monitoring of Normal and Emergency Sources
- Permit customer programming
- Display real time information
- Permit system testing
- Store customer/factory established parameters in nonvolatile memory
- Provide faceplate source status indications

1.4 FUNCTIONS/FEATURES/OPTIONS

The primary function of ATC-250 Controller is to accurately monitor power sources and provide the necessary intelligence to operate a transfer switch in an appropriate and timely manner. In addition, the ATC-250 Controller provides programming through the device's faceplate or communication option.

1.4.1 OPERATIONAL SIMPLICITY

From installation to programming to usage, the ATC-250 Controller was designed with operational simplicity in mind. Only one style needs to be considered, regardless of input/output requirements or system voltages equal to or below 240 VAC. The ATC-250 Controller provides the functionality of numerous other devices combined in one package that mounts in less than 7 by 11 inches of panel space.

The user-friendly front panel interface simplifies routine operation, programming, data presentation and setting adjustments. An LED based display provides the flexibility of back lit display for enhanced visibility. The operation of front panel membrane pushbuttons move the ATC-250 Controller display from function to function or step to step within a function.

1.4.2 STANDARD AND OPTIONAL FEATURES

A variety of programmable features are available to meet a wide variety of application requirements. Individual features or feature combinations provide the intelligence required to tailor switches to individual needs.

The features are factory activated, depending upon customer requirements. The specific variable setpoints associated with standard and factory activated features are stored in a nonvolatile memory. Activated feature setpoints are available for customer adjustment. Any feature not selected and factory activated cannot be viewed or adjusted.

NOTICE

With respect to their use in this document and as they relate to automatic transfer switch operation, the following words or phrases are defined:

Available

A source is defined as available when it is within all undervoltage/overvoltage/underfrequency/overfrequency setpoint ranges for the nominal voltage and frequency setting.

Fails

A source is defined as failed when it is outside of any undervoltage/overvoltage/underfrequency/overfrequency setpoint ranges for the nominal voltage and frequency setting for a time exceeding 0.5 seconds.

Failsafe

Failsafe refers to the condition whereby the transfer switch is connected to the Emergency Source. In the event that the Emergency Source fails, with TDEF set to zero, and Normal Source available, an immediate retransfer to Normal Source shall occur.

Transfer

A transfer is defined as the automatic operation under a normal source failure of switching the Load from the Normal Source to the Emergency Source.

Retransfer

A retransfer is defined as the automatic operation under Normal Source reappearance of switching the Load from Emergency Source to Normal Source.

VIN, RMS

This refers to the operating input voltage (VAC, RMS).

Feature #

For personnel who are familiar with previous transfer switch controller feature specifications, an attempt at equivalence to some of the features is made.

The ATC-250 Controller features are described below. The actual programmable setpoints for each feature are covered in Section 5.

Standard Feature 1: Time Delay Normal to Emergency (TDNE)

TDNE provides a time delay when transferring the Normal Source to the Emergency Source. It ensures stability of the Emergency Source. Timing begins when the Emergency Source becomes available.

Standard Feature 2: Time Delay Engine Start (TDES)

TDES delays the initiation of the engine start circuit in order to override momentary power outages or voltage fluctuations of the Normal Source. The TDES timer shall start when the Normal Source becomes unavailable. If the Normal Source becomes available while timing, the TDES timer will reset. The controller can perform the time delay engine start function without control power for 120 seconds.

Standard Feature 3: Time Delay Emergency to Normal (TDEN)

TDEN delays the transfer from the Emergency Source to the Normal Source to permit stabilization of the Normal Source before retransfer is made. Timing begins when the Normal Source becomes available.

Standard Feature 4: Time Delay Engine Cooldown (TDEC)

TDEC permits the generator to continue to run unloaded after retransfer to the Normal Source has occurred. Timing begins when the transfer to normal has been completed.

Standard Feature 5B/5J: All Phase Undervoltage/Underfrequency Sensing

The controller monitors the voltage of each phase of the emergency/standby power source. Frequency is also monitored. User adjustable dropout and pickup settings are provided.

Standard Feature 7: Time Delay Emergency Fail (TDEF)

If the Emergency Source sags below acceptable levels of voltage or frequency, a time delay of a user adjustsable 0 to 6 seconds will allow for the generator to recover from initial loading or changing loads during test.

Standard Feature 12C: Normal Connected (Green)

Indicates that the transfer switch is connected to the normal source.

Standard Feature 12D: Emergency Connected (Red)

Indicates that the transfer switch is connected to the emergency source.

Standard Feature 12G: Normal Available (Amber)

Indicates that the normal source is available and the voltage and frequency are within the programmed parameters.

Standard Feature 12H: Normal Available (Amber)

Indicates that the emergency source is available and the voltage and frequency are within the programmed parameters.

Standard Feature 23J: Plant Exerciser

This feature provides for automatic test operation of the generator. The interval is fixed at once per week with a duration equal to the programmed engine test time. Two optional modes of plant exercicing are available:

- No Load Exercise
- Load Exercising with failsafe

If desired, this feature can be disabled by choosing No at the Plant Exerciser prompt in the menu. Also if — is chosen as the test day, the engine will not be exercised.

Standard Feature 26: Normal Source Undervoltage Sensing

The controller monitors each phase of the normal power supply. User adjustable dropout and pickup settings are provided.

Standard Feature 32A: Time Delay Neutral (TDN)

TDN provides a time delay in the transfer switch neutral position when the load is transferred in one or both directions. This is to prevent excessive inrush currents due to out-of-phase switching of large inductive loads. If the TDN timer is programmed to 0 seconds, the transfer switch shall operate as if the TDN feature is disabled.

Optional Feature 5C/5K: Emergency/Standby Source Overvoltage/Overfrequency Sensing

The controller monitors the voltage of each phase of the emergency/standby power source. Frequency is also monitored. User adjustable dropout and pickup settings are provided.

Optional Feature 8: Pushbutton Bypass of Time Delays (PBNE/PBEN)

This enables the user to bypass TDNE or TDEN timer during a test or exercise. Pressing the external push-button shall cause the transfer switch to transfer to the Normal and/or Emergency Source without a time delay.

Optional Feature 8C: Bypass TDEN (PBEN)

Optional Feature 8D: Bypass TDNE (PBNE)

Optional Feature 26C: Normal Source Overvoltage Sensing

The controller monitors each phase of the normal power supply. User adjustable dropout and pickup settings are provided.

Optional Feature 26E: Normal Source Underfrequency Sensing

The controller constantly monitors the frequency of the Normal Source. User adjustable dropout and pickup settings are provided.

Optional Feature 26F: Normal Source Overfrequency Sensing

The controller constantly monitors the frequency of the Normal Source. User adjustable dropout and pickup settings are provided.

Optional Feature 50: Language Select

This feature allows the user to select between ENGLISH and SPANISH or ENGLISH and FRENCH. All information displayed on the LCD will be in the language that is selected. The default language is ENGLISH.

Optional Feature 50A: ENGLISH/SPANISH

SECTION 2: HARDWARE DESCRIPTION

2.1 GENERAL

The purpose of this section is to familiarize the reader with ATC-250 hardware, its nomenclature, and to list the unit specifications. The information presented is divided into the following three parts:

- Operator Panel
- Rear Access Area
- Specification Summary

2.2 OPERATOR PANEL

The operator panel, which is normally accessible from the outside of a panel or door, provides a means for:

- Being alerted to specific conditions
- Programming
- Parameter Monitoring/Selection/Metering

LEDs, a display window, pushbuttons and a mimic bus make up the front accessible operator panel (Figure **2-1**).

Four individual LEDs are lit when performing or indicating a specific function. For detailed information on individual LEDs refer to Paragraph 3.2**.**

A two line 16-character alphanumeric LCD display is used to display all ATC-250 Controller monitored parameters, setpoints and messages in easy to read formats. For details concerning the kind of information that can be viewed in the display window refer to Paragraph 3.4.

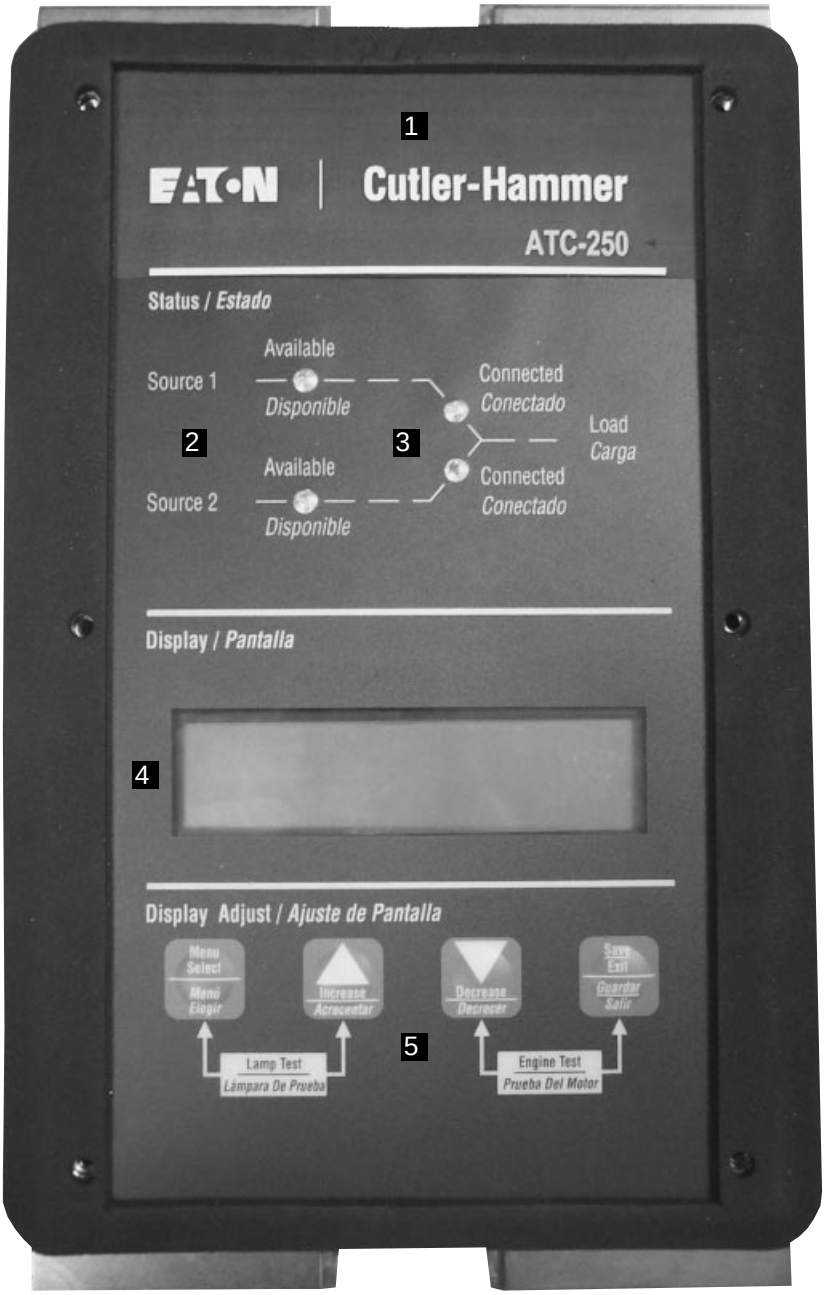
The front operator panel supports four long-life membrane pushbuttons. Pushbuttons accomplish their function when pressed and released. Refer to Paragraph 3.3 for information concerning the function of specific pushbuttons.

2.3 REAR ACCESS AREA

The rear access area of the ATC-250 Controller is normally accessible from the rear of an open panel door (Figure **2-2**).

All wiring connections to the ATC-250 Controller are made at the rear of the chassis. For the sake of uniform identification, the frame of reference when discussing the rear access area is facing the back of the ATC-250 Controller with the panel door open.

The right rear of the chassis provides terminal blocks P2 and P3 for voltage monitoring of Source 1 and Source 2 respectively. Terminal block P6 provides connections for various functional inputs and outputs, as well as, dry contacts for control inputs and outputs. Serial communication with the controller is provided through P7 connector. Terminal block P10 provides connections for various inputs.



1 ATC-250 Faceplate

2 Source Status LED's

3 Mimic Bus

4 Display Window

5 Membrane Pushbuttons

Figure 2-1: ATC-250 Controller Operator Panel

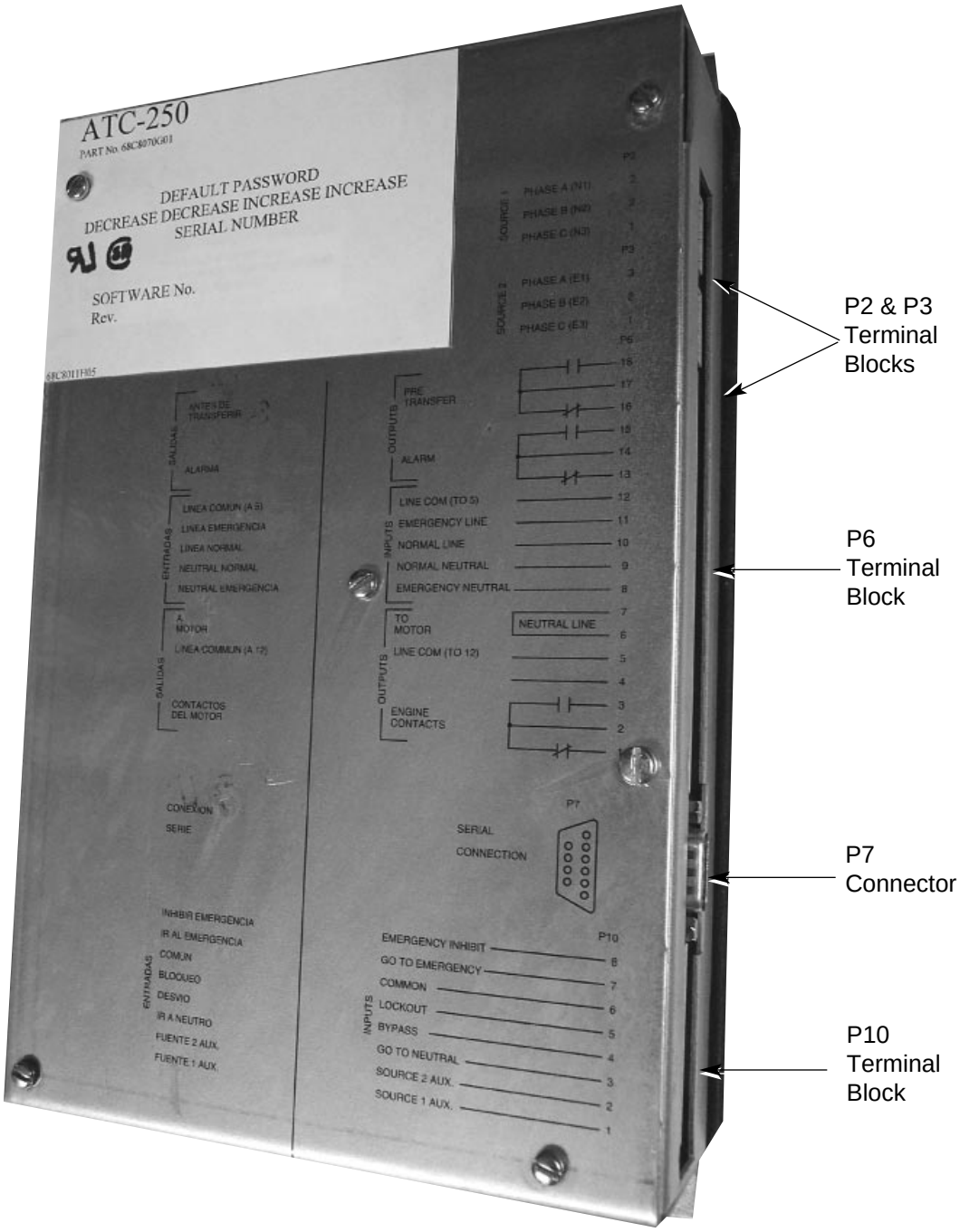


Figure 2-2: ATC-250 Controller (Rear View)

2.4 SPECIFICATION SUMMARY

Table 2.1 ATC-250 Controller Specifications

Parameter	Specification
Input Control Voltage	(50-150)% of $V_{(IN, RMS)}$ 50/60 Hz
Voltage Measurements of	Normal Source V_{AB} Emergency Source V_{AB} Normal Source V_{BC} Emergency Source V_{BC} Normal Source V_{CA} Emergency Source V_{CA}
Voltage Measurement Range	0 to 360 VAC RMS (50/60 Hz)
Voltage Measurement Accuracy	± 2% of reading over the monitoring range
Frequency Measurements of	Normal Source (S1), Emergency Source (S2)
Frequency Measurement Range	40 Hz to 70 Hz
Frequency Measurement Accuracy	± 0.3 Hz over the measurement range
Undervoltage Dropout Range	50% to 97% of the nominal system voltage
Undervoltage Pickup Range	Dropout + 2% to 99% of the nominal system voltage
Overvoltage Dropout Range	105% to 120% of the nominal system voltage
Overvoltage Pickup Range	103% of the nominal system voltage to DO -2%
Underfrequency Dropout Range	90% to 97% of the nominal system frequency
Underfrequency Pickup Range	Dropout + 1Hz to 99% of the nominal system frequency
Overfrequency Dropout Range	103% to 110% of the nominal system frequency
Overfrequency Pickup Range	101% of the nominal system frequency to DO -1Hz
Operating Temperature Range	-20 C to +70 C
Storage Temperature Range	-35 C to +85 C
Operating Humidity	0 to 95% relative humidity (non-condensing)
Generator Start Relay	5A, 1/6 HP @ 250 VAC 5A @ 30VDC with a 30W maximum load
Alarm Relay	10A, 1-3 HP @ 250 VAC 10A @ 30VDC
Applicable Testing	UL Recognized Component Meets Intent of UL991 Meets IEC 1000-2, 3, 4, 4-6 and 5 Meets CISPR 11 Complies with FCC Part 15, Class A
Enclosure Compatibility	NEMA 1 NEMA 3R (outdoor) UV Resistant ATC-200 Faceplate

SECTION 3: OPERATOR PANEL

3.1 GENERAL

The operator panel, which is normally accessible from the outside of a panel or door, provides a means for being alerted to specific conditions, receiving functional help, programming and parameter monitoring/selecting. For the purpose of familiarization, the panel is divided into three sub-sections and discussed individually:

- LEDs
- Pushbuttons
- Display Window

3.2 LEDs

The four LEDs indicate the actual status of both sources.

Normal Source Available LED

This amber LED is lit when the Normal Source meets the user programmed setpoint criteria.

Normal Source Connected LED

This green LED displays the status of the transfer switch position. It illuminates when the Normal Source is available and the transfer switch is in normal position. Indication of the transfer switch in normal position is accomplished by sensing the closed A-contact of the normal breaker auxiliary.

Emergency Source Available LED

This amber LED is lit when the Emergency Source meets the user programmed setpoint criteria.

Emergency Source Connected LED

This red LED displays the status of the transfer switch position. It illuminates when the Emergency Source is available and the transfer switch is in emergency position. Indication of the transfer switch in emergency position is accomplished by sensing the closed A-contact of the emergency breaker auxiliary.

3.3 PUSHBUTTONS

There are four front panel membrane type pushbuttons. Pushbuttons accomplish their function when pressed and released. Certain pushbuttons, like the Increase and Decrease Pushbuttons, will also continue to scroll if they are pressed and not released.

3.3.1 Menu Select Pushbutton

The user can scroll through the available display information. Pushing the Menu Select key will scroll through the voltage and frequency of each source.
When in the program menu, pushing the Menu Select key will cause the selected setpoint value to blink and allow the user to change selected setpoint using Decrease or Increase keys.

3.3.2 Increase Pushbutton

When the user initiates the program mode, each press of the Increase key will scroll through all available setpoints/features. By pressing Menu Select key first (to select a setpoint) and then pressing and releasing the Increase button the displayed setpoint can be increased by one. The Increase pushbutton will continue to scroll if it is pressed and not released.

3.3.3 Decrease Pushbutton

When the user initiates program mode, each press of the Decrease key will scroll through all available setpoints/features. By pressing Menu Select key first (to select a setpoint) and then pressing and releasing the Decrease button the displayed setpoint can be decreased by one. The Decrease pushbutton will continue to scroll if it is pressed and not released.

3.3.4 Save/Exit Pushbutton

When in program mode and the user has selected the desired setpoints for nominal operation, pressing the save button will store the setting. By pressing the Save/Exit key on more time the user will exit the program mode and all settings will then be programmed into the controller.

3.4 DISPLAY WINDOW

The ATC-250 Controller includes a two line 16-character alphanumeric LCD display. The display has a green high contrast background that allows clear visibility of any information displayed. The display is continuously lit, except when the controller is transferring or in alarm condition, for clear visibility under poorly lit or no light conditions.
Five different displays can be presented via the Display Window:

- Status Display
- Source 1 Display
- Source 2 Display
- Setpoints Display
- Engine Test Display

NOTICE

Although a wide variety of parameters and setpoints can be displayed, they are not displayed if they were not originally ordered and programmed.

3.4.1 STATUS DISPLAY

This display provides messages regarding anything that is presently changing or happening to the switch's status, including source information, timer countdown and failure reports. The display functions in a similar manner, whether in the Automatic or Program Modes.
If an Alarm condition exists the display's backlight extinguishes. This is intended to give a visual indication that an alarm condition occurred. The following alarms might be displayed:

- MOTOR TIME OUT occurs when a transfer has been initiated but never completed.
- LOCKOUT occurs when one of the breakers trips due to an overcurrent condition or fault current condition (Option 16 is required).
- FAILSAFE occurs when the emergency source failed in emergency mode.
- RTC FAILURE occurs if an internal component fails. The rtc battery has failed and must be replaced.

3.4.2 SOURCE 1 AND 2 DISPLAYS

These displays indicate the present status of the sources in terms of voltage and frequency. To select the source, the Menu Select Pushbutton has to be pressed and released.

3.4.3 SETPOINTS DISPLAY

This display indicates presently programmed setpoints. The setpoints can only be viewed and altered in the Program Mode. Keep in mind, if a feature was not originally ordered and programmed, it will not be displayed. Refer to Section 5 for details.

3.4.4 ENGINE TEST DISPLAY

This display provides messages regarding anything that is happening to the switch in the Engine Test Mode. When the Engine Test Mode is selected by pressing and holding Decrease and Save/Exit Pushbuttons, it can be interrupted. The switch will go through the entire test procedure before returning to normal operation based on the settings of the Plant Exerciser.

SECTION 4: OPERATION

4.1 GENERAL

This section specifically describes the operation and functional use of the ATC-250 Controller. It is divided into three main categories:

- Automatic Mode
- Engine Test Mode
- Programming Mode

The practical use of and operation within each category will be discussed. In this section it is assumed that prior sections were reviewed and that operator has a basic understanding of the hardware.

NOTICE

It is important to remember that the ATC-250 Controller continues to provide programmed protection and automatic operation no matter which mode the device is in at the time it is called upon to operate.

4.2 AUTOMATIC MODE

The automatic mode of the ATC-250 Controller provides for automatic transfer and retransfer from source to source as dictated by the features supplied and their programmed setpoint values. It provides a summary of The ATC-250 Controller intelligence and supervisory circuits which constantly monitor the condition of both Normal and Emergency power sources thus providing the required intelligence for transfer operations. These circuits, for example, automatically initiate an immediate transfer of power when power fails or voltage level drops below a preset value. Exactly what the ATC-250 Controller will initiate in response to a given system condition depends upon the combination of standard and selected optional features.

4.3 CONTACT INPUTS

The control inputs of the ATC-250 Controller are wetted contacts.

Source 1 Auxiliary Closed

This contact is hard-wired to the normal breaker auxiliary
contact that is closed when the normal breaker is closed (A-contact).

Source 2 Auxiliary Closed

This contact is hard-wired to the emergency breaker auxiliary contact that is closed when the emergency breaker is closed (A-contact).

Source 1 and Source 2 Lockout (Requires Option 16)

This contact is hard-wired to the normal and/or emergency breaker lockout (bell alarms) contacts that close when one of the breaker has tripped due to an overcurrent condition or fault current condition. Opening of this contact inhibits any transfer from occurring and the message ******LOCKOUT****** will appear on the LCD.

Bypass Time Delay(s) (Requires Option 8)

Closure of this contact will bypass the programmed values for both of the TDNE and TDEN timer setpoints.

Go To Neutral (Services Disconnected) (Option 37A)

Closure of this contact forces the controller to switch to the neutral position thereby disconnecting the load from both sources. Enabling of this function forces a minimum neutral position time as determined by the programmed TDN setpoint.

Go To Emergency (Option 26D)

Closure of this contact forces the controller to start the generator and switch to the emergency position thereby disconnecting the load from the Normal Source. The controller will not return to the Normal Source until the contact is opened and Normal Source is available.

4.4 RELAY OUTPUTS

The control outputs of the ATC-250 Controller are dry relay contacts. These relays are comprised of a latching Form C relay to provide the Generator Start Relay contact, a Form C contact for the Transfer Motor Relay contact, and a Form C relay for an alarm output. The dielectric rating for each output is a minimum of 1500 VAC.

Generator Start Relay

This latching relay is the generator start relay for system configurations that employ a generator on the emergency source. This relay employs a Form C contact for closure of the generator start circuit. The generator start relay is rated for 5A, 1/6 HP @ 250 VAC. The DC rating is 5A @ 30VDC with a 30W maximum load.

Transfer Motor Relay

This Form C contact is used to close the electrical path of the transfer motor control circuit. Closure of this contact will initiate a transfer from the Normal Source to Emergency Source and from Emergency Source to Normal Source as required per normal transfer switch operation. The transfer motor relay is rated for 8A, 1-3 HP @ 250 VAC. The DC rating is 8A @ 30VDC.

Alarm Relay

The full Form C contact of this relay may be wired to an alarm enunciator panel to indicate problem with the ATS. This relay is normally de-energized to indicate an absence of an alarm state. Energization of this relay indicates the presence of an alarm condition. An alarm condition will occur if a transfer has been initiated but is never completed (This may indicate that something is wrong with the motor or transfer mechanism). The alarm contact will also change state if the controller detects a phase reversal condition between the normal and emergency sources. The controller will also inhibit transfer on this condition. The alarm relay is rated for 10A, 1-3 HP @ 250 VAC. The DC rating is 10A @ 30VDC.

4.5 OPERATION VOLTAGE AND MEASUREMENTS

The ATC-250 Controller operates directly from the line sensing inputs of the two different sources (normal and emergency). The nominal operating system inputs are from 110VAC-240VAC. The standard system assumes that neutral is available and that the transfer motor can therefore be powered from an available 120 VAC source. If a neutral conductor is not available, a 120VAC supply is created by an external transformer. The unit operates on single and three phase systems with selectable frequency settings of 50Hz or 60Hz.

All voltage monitoring and measurements are true RMS measurements.

The ATC-250 Controller is capable of performing the time delay engine start function without control power for a minimum of 120 seconds.

4.6 ENGINE TEST MODE

Pressing the Save/Exit button and the Decrease button simultaneously will initiate an Engine Test. The test is conducted using settings programmed for the Plant Exerciser.

To exit the Engine Test mode before the end of the test, press the Save/Exit key. This will return the controller to the automatic mode.

4.7 PROGRAMMING MODE

The ATC-250 Controller is fully programmable from the devices faceplate once in the Programming Mode. Any operator associated with programming the ATC-250 Controller will quickly discover that ATC-250 Controller programming is just a matter of simple, repetitive steps. Because of the importance placed, however, on this function and its critical relationship to the system proper functioning, Section 5 is dedicated to the Programming Mode. Refer to that section and Table **5.1** for details.

SECTION 5: PROGRAMMING

5.1 INTRODUCTION

NOTICE

Although all ATC-250 Controller programmable features are addressed in this section, only those ordered by the customer and initially programmed at the factory will appear in the display for programming changes in the field.

The ATC-250 Controller is fully programmable from the devices faceplate or through the serial communication port. Users can reprogram setpoints as well as other parameters only while the device is in the Program Mode.

The Program Mode is achieved by depressing the Menu/Select key and Save/Exit key simultaneously until the prompt “Enter Password” appears (Approximately 5 seconds).

5.2 PASSWORD

To enter the program mode, the ATC-250 Controller requires a password to prevent unauthorized persons from modifying setpoint values.

The password is factory set to a combination of 4 depressions of the Decrease and Increase keys in sequence. The default password is (Decrease, Decrease, Increase, Increase).

Once the correct password is entered, the password may be changed by the user at the prompt ***“Change Password?”*** At this prompt, the user may choose NO by pressing the INCREASE key or YES by pressing the DECREASE key. If NO is chosen, the password will remain the same and the user will then be able to scroll through and set the setpoint values. If YES is chosen, a new password may be entered using a combination of the Menu/Select, Increase, and Decrease keys. The user will be required to enter the new password again to verify. The setpoints will then be available to the user for modification.

5.3 SETPOINTS MENU

When in the setpoints menu, by depressing the Increase or Decrease keys, the user can scroll through the operating parameters. Any setpoint values can be adjusted using the Menu Select key to select the setpoint that needs to be changed (value will be blink on the display when selected). The setpoint's value can be adjusted using Increase or Decrease keys. To save new value to memory, depress the Save/Exit key. Once all of the setpoint operating parameters have been entered and saved, the user may exit program mode by depressing the Save/ Exit key one more time. Once this is completed, the controller acknowledges the setpoint values have been programmed by displaying the message ***Setpoints Programmed.***

5.4 LAMP TEST

Pressing the Increase and Menu Select buttons simultaneously will cause the all LEDS to illuminate for a minimum of ten seconds. During this lamp test the LCD displays the message ***Lamp Test.***

5.5 ENGINE TEST

Pressing the Decrease and Save/Exit buttons simultaneously will cause an engine test (uses the Plant Exercise setpoints). During this engine test, the LCD will display the phrase ***Exercising Generator.***

5.6 SERIAL CONNECTION

A serial input connection is accessible from the rear of the ATC-250 Controller. This input is used for factory programmability of options and setpoints.

5.7 PROGRAMMABLE FEATURES/SETPOINTS

CAUTION

CHANGING THE SYSTEM NOMINAL VOLTAGE OR FREQUENCY WILL AUTOMATICALLY CHANGE ALL THE PICKUP AND DROPOUT SETTINGS TO THE NEW DEFAULT VALUES.

All ATC-250 Controller programmable features and associated setpoint possibilities with any required explanations are presented in Table **5.1**. Remember that only features originally ordered and factory programmed will appear in the display.

Table 5.1 Programmable Features/Setpoints

Program Setpoint Display	Setpoint Possibilities	Display Explanation
Lang	English/ French or English/ Spanish	Language the controller displays messages
Current Day	Mon - Sun	Current Day - requires to only be set once
Current Hour	0 - 23	Current Hour
Current Min	0 - 60	Current Min
Nom. Volt	110 VAC - 240 VAC	System Operating Voltage
Nom. Freq	50Hz or 60Hz	System Operating Frequency
Phases	1 or 3	Single Phase or Three Phase System
TDNE	0 sec. to 1800 sec.	Time Delay Normal to Emergency
TDES	0 sec. to 120 sec.	Time Delay Engine Start
TDEN	0 sec. to 1800 sec.	Time Delay Emergency to Normal
TDEC	0 sec. to 1800 sec.	Time Delay Engine Cooldown
TDN	0 sec. to 120 sec.	Time Delay Neutral
TDEF	0 sec. to 6 sec.	Time Delay Engine Fail
N-UV-DO	50% to 97% of nominal	Source 1 Undervoltage Dropout (% of nominal)
N-UV-PU	DO +2% to 99% of nominal	Source 1 Undervoltage Pickup (% of nominal)
E-UV-DO	50% to 97% of nominal	Source 2 Undervoltage Dropout (% of nominal)
E-UV-PU	DO +2% to 99% of nominal	Source 2 Undervoltage Pickup (% of nominal)
N-OV-DO	105% to 120% of nominal	Source 1 Overvoltage Dropout (% of nominal)
N-OV-PU	103% of nominal to DO -2%	Source 1 Overvoltage Pickup (% of nominal)
E-OV-DO	105% to 120% of nominal	Source 2 Overvoltage Dropout (% of nominal)
E-OV-PU	103% of nominal to DO -2%	Source 2 Overvoltage Pickup (% of nominal)
N-UF-DO	90% - 97% of nominal	Source 1 Underfrequency Dropout (Hz)
N-UF-PU	DO +1Hz to 99% of nominal	Source 1 Underfrequency Pickup (Hz)
E-UF-DO	90% - 97% of nominal	Source 2 Underfrequency Dropout (Hz)
E-UF-PU	DO +1Hz to 99% of nominal	Source 2 Underfrequency Pickup (Hz)
N-OF-DO	103% to 110% of nominal	Source 1 Overfrequency Dropout (Hz)
N-OF-PU	101% of nominal to DO -1%	Source 1 Overfrequency Pickup (Hz)
E-OF-DO	103% to 110% of nominal	Source 2 Overfrequency Dropout (Hz)
E-OF-PU	101% of nominal to DO -1%	Source 2 Overfrequency Pickup (Hz)
Plant Exerciser	Y or N	Plant Exerciser enabled or disabled
PE Load Transf	Y or N	Plant Exerciser Engine test with or without load
Engine Run	0 - 600 min.	Engine run time on exercise
Test Day	---, or Mon - Sun	Plant Exerciser Day of the Week
Test Hour	0 - 23	Plant Exerciser Hour
Test Min	0 - 60	Plant Exerciser Test Minute

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