

CONSTRUCTION GUIDELINE

HAZELTINE MODEL 2800 TRANSMITTER INSTALLATION TYPE "O2"

NOT FOR NEW CONSTRUCTION – FOR MAINTENANCE ONLY

1. HAZELTINE EQUIPMENT DESCRIPTION

The new Hazeltine transmitter (Model 2800) is known within Seattle City Light as a Type "O2" transmitter. It is microprocessor controlled. The transmission frequency is selected by programming with a laptop computer in conjunction with the frequency select plug. The ID Number is selected by programming with a laptop computer. This transmitter uses the same interface cable as the Type "O1" transmitter and therefore is directly interchangeable with the Type "O1". From the outside, it has the same physical appearance as the Type "O1".

1.1 TRANSMITTER

The transmitter provides status information for five switches or contacts and three load current inputs. This status is transmitted by coded power line carrier signals over the network feeders to the substation receiver. Unique identification and frequency selection for each transmitter is provided by the plug-in program board and the power plug. Data for the load current is from current transformers (CT's) installed on the network protector's main current transformer secondary leads. The unit, when properly connected to the interface cable, is submersible.

1.2 CURRENT TRANSFORMER ASSEMBLY (CT'S)

The Hazeltine Model 2358 CT is used to monitor the load currents on each phase of the network transformer from inside the transformer's network protector. The Hazeltine Model 2358 CT is installed on the leads from the main network protector CT's. The Model 2358 is internally protected for open circuits under load.

1.3 FREQUENCY SELECTION AND ID NUMBER

The coding of the transmitter for both identification (ID No.) and frequency selection is programmed into the on board microprocessor per the instructions in section 4 of this Construction Guideline.

1.3.1 Frequency selection is by site survey from the manufacturer and one frequency is assigned to all transformers on that feeder. Network Engineering maintains the current frequency that is assigned to each feeder and it will be included on the installation drawing. There are four frequencies available for use. Each frequency is associated with a color for ease of frequency identification as shown below:

Transmission Frequency kHz	Associated Color
45 kHz	Red
50 kHz	Blue
55 kHz	Green
62 kHz	Yellow

1.3.2 The ID number is assigned by Network Engineering. Crews will need to call Network Engineering when they are ready to install the transmitter.

1.4 INTERFACE CABLE

The interface cable assembly is supplied with two connectors and a rubber boot molded onto one end, three sealed two-wire rubber-covered cables, and a cable with a pressure seal containing loose wires at the opposite end. The rubber boot end is attached to the monitor transmitter. The three sealed two-wire rubber-covered cables are attached to switches outside the network protector as directed on the transformer installation drawing. The cable with the pressure seal containing loose wires is routed through the network protector case and attached inside the network protector (see Figure 2).

STANDARDS COORDINATOR

STANDARDS SUPERVISOR

UNIT DIRECTOR

CONSTRUCTION GUIDELINE

2. HAZELTINE EQUIPMENT INSTALLATION

2.1 TRANSMITTER

Two transmitter mounting straps are provided. Clamp the transmitter to the support rack (Stock No. 687725) using the two mounting straps. Locate the mounting straps 10 inches apart.

2.2 CURRENT TRANSFORMERS (Three Required)

Install the Hazeltine Model 2358 CT on the non-polarized side of each phase of the network protector relaying CT's ("X" side).

2.3 INTERFACE CABLE

2.3.1 Connect the transmitter to the interface cable. The rubber boot end of the interface cable is attached to the transmitter by connecting the electrical plugs per Figure 2 and in the following order:

- A. Connect the digital plug to the digital receptacle.
- B. Connect the frequency select plug to the back of the frequency select receptacle. This plug is to be installed to either P1, P2, P3, or P4 (green, blue, red, or yellow wires) as identified by the color code of the selected frequency.
- C. Install the frequency select receptacle to the back of the transmitter until it locks into place.
- D. Slide the boot down over the transmitter housing as far as possible. Slide the hose clamp up over the boot and locate it squarely on the transmitter housing (no sideways twist). Tighten the hose clamp securely and mount the transmitter with the straps in the mounting brackets.
- E. Near the connector and boot end, three two-wire rubber-covered cables "break out" and can be routed separately to switch sensors located on the exterior of the transformer. Use switch terminals that are normally open (closed on detected abnormal condition) and seal the connections to make them waterproof. The three cables have color-coded sleeves and are used as follows:

Color	Flag Assignment	Connected to:
Orange	"C" Sensor	Thermometer on transformer
Yellow.....	"D" Sensor	Unused
Green	"E" Sensor	Oil level gage on transformer

- F. If the transformer has a dial-type thermometer with alarm contacts, connect leads from the Hazeltine's orange cable to the alarm contacts. Seal the connections to make them waterproof.
- G. If the transformer has a dial-type oil level gage with alarm contacts, connect leads from the Hazeltine's green cable to the alarm contacts. Seal the connections to make them waterproof.

2.3.2 Connect the interface cable to the network protector per Figure 1 and the following instructions:

- A. On all pre-1960 Westinghouse network protectors, installation of a microswitch, mounted on the left-hand arc-shoot barriers, is required to obtain a non-used switch position for brown and green wires (see Figure 1).
- B. Installation of an autotransformer is required when converting from 277/480V to 125/216V. The autotransformer is connected between the network side Phase 2 and the ground (see Figure 4).
- C. The loose wires must be passed through an opening in the network protector casing tapped for a 1/2-inch NPT so that the seal is maintained properly. The 12 color-coded wires entering the network protector are connected as follows (see Figure 1):

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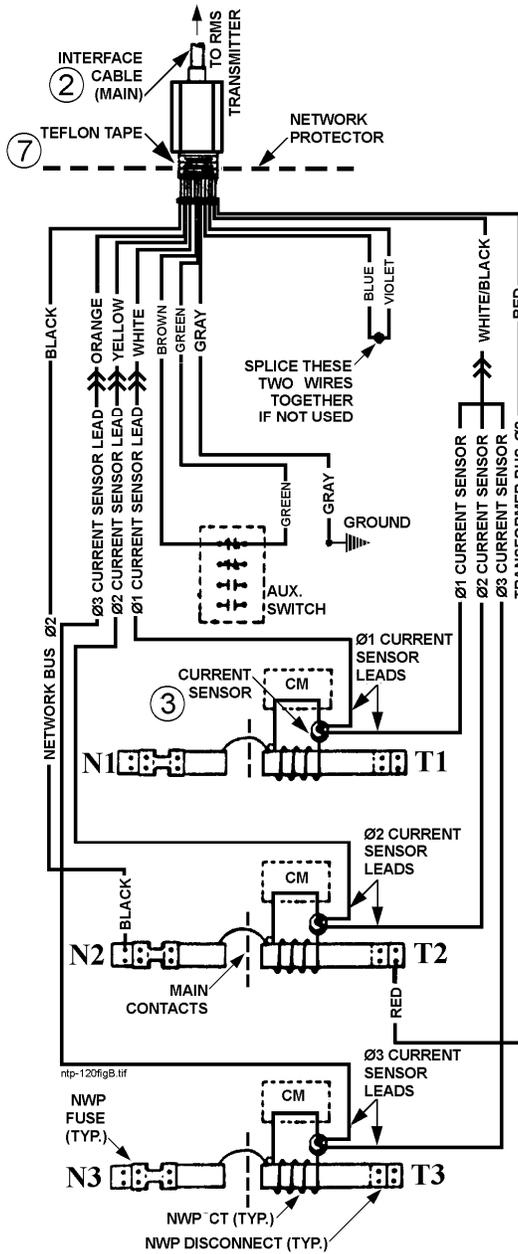


FIGURE 1.

Color-Coded Wire Connections

- RED** Connect as directly as possible to the Phase 2 bus on the transformer side (not the network side) of the network protector (125V or 277V).
- BLACK** Connect as directly as possible to the Phase 2 bus on the network side of the network protector (125V nominal). On 277/480V applications, connect to terminal No. 2 or black lead of the autotransformer (see Figure 4).
- GRAY** Connect solidly to a good ground. On 277/480V applications, connect to terminal No. 3 or gray lead of the autotransformer and to a good ground (see Figure 4).
- WHITE** Splice and carefully tape this wire to one of the wires extending from the current transformer assembly for Phase 1.
- YELLOW** Same as above for Phase 2.
- ORANGE** Same as above for Phase 3.
- WHITE/BLACK** Splice and carefully tape the remaining wire from each of the load current sensor assemblies to this wire.
- BLUE & VIOLET** These two wires must be shorted together and taped securely. This is an unused condition and if not shorted, will cause report flag "A".
- BROWN & GREEN** Connect these wires to unused auxiliary contacts on the network protector circuit breaker (either color to either connection). The connection to the auxiliary contacts must be such that the contacts are open when the network protector is closed, and closed when the network protector is open. For pre-1960 Westinghouse, use the microswitch installed in paragraph 2.3.2.a. This will cause report flag "B" when the protector is open.

FIGURE 1 MATERIAL LIST

Item No.	Quantity	Description	Stock No.	Cancelled Stock No.
2	1 each	Interface Cable (Main)	obsolete*	687715
3	3 each	Load Current Sensor, CT	687720	-
7	1 roll	Teflon Tape	736690	-

* No stock, Stock Number cancelled.

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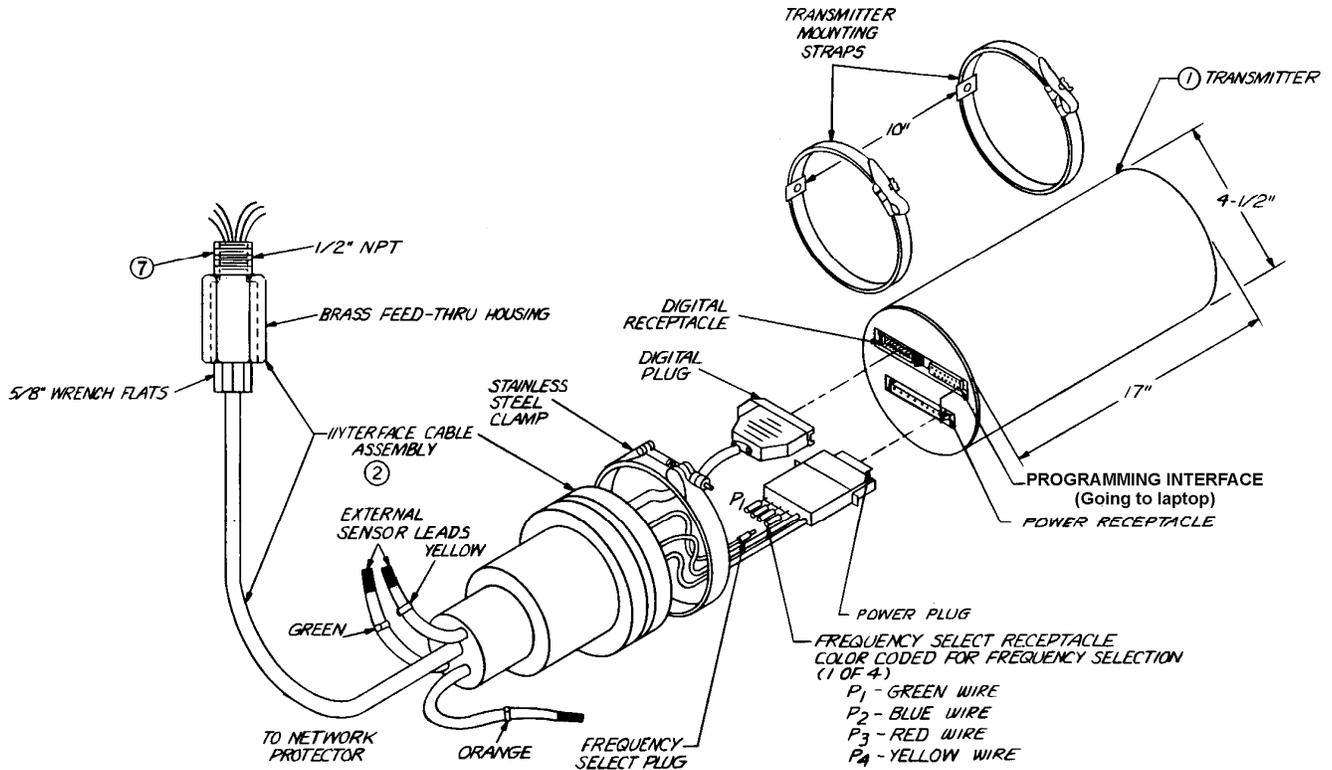


FIGURE 2

Transmitter, Frequency Selector Plugs, and Interface Cable Assembly

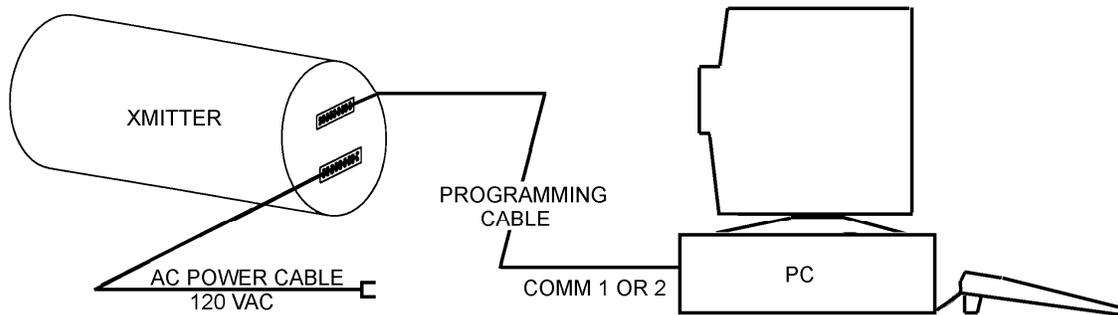
HAZELTINE MATERIAL LIST

Item	Quantity	Description	Stock No.	Cancelled Stock No.
1	1 each	Transmitter, Remote, Model 2800, type "O2"	obsolete*	687705
2	1 each	Interface Cable	obsolete*	687715
3	3 each	Load Current Sensor, CT	687720	—
4	1 each	Support Rack	687725	—
6	1 each	Autotransformer, for 480V Transformers	687730	—
7	1 roll	Teflon Tape	736690	—

* No stock, Stock Number cancelled.

CONSTRUCTION GUIDELINE**3. TEST EQUIPMENT**

After the interface cable has been installed, it should be checked with a cable installation tester.

4. PROGRAMMING THE HAZELTINE MODEL 2800 TRANSMITTER, Type "O2"**FIGURE 3**

Connect Transmitter, PC, and Cables as Shown

Double click on shortcut to Ce_prog.exe to start program.

In order to proceed to the transmitters main menu, you must first enter the following information in capital letters.

NOTE: YOU MAY TAB, POINT & CLICK, OR HIT RETURN TO NEXT WINDOW.

VAULT NO.	VS1234	:ENTER VAULT NAME BY NOMENCLATURE.
	TM3355	:ENTERED IN THE FIRST LINE IN START MENU.
	V 9853	:ALL ENTRIES MUST START AND CONTAIN A :"VS", "TM" or "V ".
		:VS, SUBMERSIBLE PROTECTOR.
		:TM, MANHOLE PROTECTOR.
		:V , OPEN PROTECTOR DRY INSTALLATION.
FEEDER NO.	17M83	:ENTER NETWORK AND FEEDER NUMBER.
		:ENTERED IN SECOND LINE IN THE START MENU.
		:ANY ALPHA/NUMERIC ENTRY ACCEPTABLE.
PORT ON PC.		:ENTER THE PC COMM. PORT "1" or "2", IN THIRD :LINE IN THE START MENU.
QUIT		:TO QUIT CLICK OR TAB TO THIS WINDOW.
		:ENTER OR CLICK TO EXIT.
MAIN MENU:		CLICK OR ENTER TO PROCEED TO NEXT MENU.
MAIN MENU:		

NOTE: YOU MAY TAB OR POINT AND CLICK TO NEXT WINDOW.

EACH WINDOW FROM HERE ON HAS ITS OWN HELP MENU WHEN YOU ACTIVATE THE WINDOW.

CONSTRUCTION GUIDELINE**ID NUMBER:**

In main menu, click or enter where pointer is located in "ID No." Control window. Now the ID help window is visible. The cursor is now set to first number in ID number window with the original ID number. Use delete key to remove old ID and then enter new ID number. Any invalid entries will be error flagged and automatically removed. Then click or tab to send or cancel. Click or enter on send and new ID will be programmed and verified into/from transmitter. The new ID located in ID control window.

ID No. 1 TO 1023 : * Transmitter ID, replaces program card

* = Old feature implemented by using program card

NOTE: Click or enter on cancel and the old ID will remain in transmitter with old ID located in ID window.

FREQUENCY:

To program frequency, click or enter on "frequency". Then enter the transmitter frequency red, blue, green, yellow by typing in the lower left hand box or clicking on the arrow selecting the required frequency.

To exit or program a new transmitter location, click or enter on that control window.

FREQ. R, B, G, Y : * Transmitter freq., Replaces program card

* = Old feature implemented by using program card

AN EXAMPLE OF SUCSESSFUL PROGRAMING

Transmitter programmer output file "Log1" is created when you exit and save. The file is placed on your hard drive in the Trs_Con directory as Log1. To view this file in Windows Explorer, rename file to Log1.txt.

12-12-1996 14:14:32 :Date & Time Transmitter Was Programmed.

:This Is Inputted From The PC Date & Time

Vault Number - Tm1234

Feeder Number - 17m83

Id No. - 1000

THESE ITEMS BELOW ARE MEANINGLESS TO THE MODEL 2800 AND SHOULD BE IGNORED:

CT Mult. - 120

Current Thresh High - 120

Voltage Thresh High - 140

Voltage Thresh Low - 96

Analog1 Thresh - 100

Analog2 Thresh - 100

THIS FREQUENCY LINE IS VALID.

Transmit Frequency - BLUE

THESE ITEMS BELOW ARE MEANINGLESS TO THE MODEL 2800 AND SHOULD BE IGNORED:

Flag Switches

Flag A Active On OPEN

Flag B Active On CLOSE

Flag C Active On CLOSE

Flag D Active On CLOSE

Flag E Active On CLOSE

Flag F Active On CLOSE

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THESE ITEMS BELOW ARE MEANINGLESS TO THE MODEL 2800 AND SHOULD BE IGNORED (Continued):

- ALARM SENSE
- Analog1 Thresh OVER
- Analog2 Thresh OVER
- ALARM ENABLES
- Flag A OFF
- Flag B OFF
- Flag C OFF
- Flag D OFF
- Flag E OFF
- Flag F OFF
- Current Alarm OFF
- Over Voltage Alarm OFF
- Under Voltage Alarm OFF
- Analog1 Alarm OFF
- Analog2 Alarm OFF
- Pump Alarm OFF

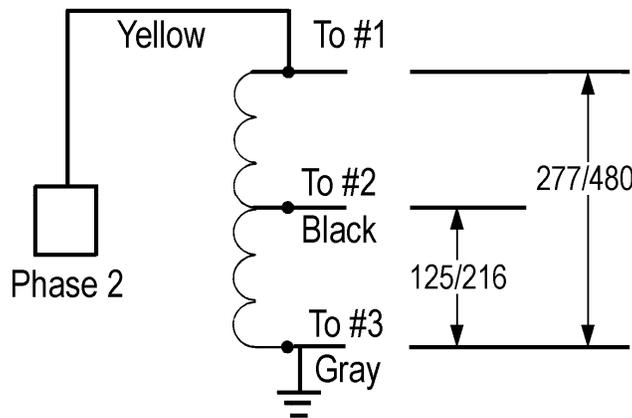


FIGURE 4 - Autotransformer Wire Connection
 (Required for 480/277V applications)

Item	Quantity	Description	Stock No.
6	1 each	Autotransformer, for 480V Transformers	687730