



TRANE™

General Service Bulletin

CGWC-SB-2A

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Literature Change History:

- CGWC-SB-2:** Original issue of bulletin.
CGWC-SB-2A: Added "diagnostic tips" to end of W7900 (1U12) checkout procedure; added new Steps 4 and 5 to W7901 (4U14) checkout procedure, plus additional callouts to Figure 3.

Subject: W7900 and W7901 Control Checkout Procedures
 (for CGAC, CCAC, CGWC, CGRC, CCKC and CGHC Reciprocating Liquid Chillers)

Introduction:

This service bulletin outlines the correct step-by-step instructions for checkout of the W7900 control module (1U12) used in Model CGAC, CCAC, CGWC, CGRC, CCKC and CGHC reciprocating liquid chillers, and the W7901 control module (4U14) used in Model MUAA and MUWA multiple-unit control panels. The checkout procedures originally published in the operation/maintenance manuals that shipped with these units contained several errors; literature order numbers of the affected manuals are as follows:

CCAC- M -1A	CGAC- M -1	CGWC- M -1A
CCAC- M -2	CGAC- M -3	CGWC-IOM-1
CCKC- M -1A	CGAC- M -4	MUAA-IOM-1A

Work is presently underway to republish each of these manuals with the corrected W7900 or W7901 checkout procedure.

Discussion:

W7900 Checkout Procedure

Use the checkout procedure that follows to check the operation of W7900 control modules used in CGAC, CCAC, CGWC, CGRC, CCKC and CGHC reciprocating liquid chillers.

Note: Substitute the following procedure for the one published in the service literature manuals identified under "Introduction". (Notice that the W7900 is identified as "chiller control module 1U12" in each of these manuals.)

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change specifications and design without notice. The installation and servicing of the equipment referred to in this booklet should be done by qualified, experienced technicians.

Chiller Control (1U12) Test Procedure

To determine whether or not the chiller control module (W7900, or "1U12") is functioning properly, perform the checkout procedure outlined below. Required tools include a highly accurate, digital volt-ohmmeter and an accessory resistor-and-test-plug kit (Trane part no. TOL-0101).

Note: If necessary, a "Decade Box" resistance selector (Trane part no. TOL-0099 or equivalent) can be substituted for the resistors provided with TOL-0101. Both TOL-0101 and TOL-0099 are available from stock location "51" in La Crosse.

1. De-energize the chiller.

WARNING: To prevent injury or death due to electrical shock, lock all electrical disconnects open.

2. Disconnect:

- a. Wires 116A and 116B from Terminal 2 of Relay 1K45;

- b. all wires connected to the terminals on the left side of chiller control module 1U12; and,

- c. all external connections to auxiliary relay module 1U13 except for these:

- (1) the 24 VAC supply power wires to each control;
- (2) the ground wire; and,
- (3) the 5 wires which connect modules 1U12 and 1U13.

See Figures 1 and 2 for electrical schematics of the wiring connected to these controls.

3. Insulate the exposed ends of all of the leads removed in Step 2; this is important since some of these leads will be "hot" when the panel is re-energized.

WARNING: Use care when measurements or adjustments must be made with the power on to prevent injury or death due to electrical shock.

4. Remove the red diagnostic port cover from the bottom of chiller control module 1U12 and insert the diagnostic plug from TOL-101.

5. Energize the unit control panel and observe the LED indicator lights; none of the LEDs should be illuminated at this time.

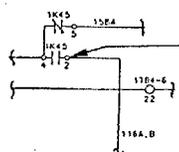
6. Measure the power supply voltage between the 24 VAC input terminals (i.e., Terminals TR and TR) on chiller control module 1U12; the reading obtained should be 25 ± 5 VAC.

If the power supply voltage does not fall within the acceptable range, check for a defective fuse or 24 VAC transformer.

7. Measure the power supply voltage between Terminals TR and TR (i.e., the 24 VAC input terminals) on auxiliary relay module 1U13; again, the reading obtained should be 25 ± 5 VAC.

If the power supply voltage does not fall within the acceptable range, check for a defective fuse or 24 VAC transformer.

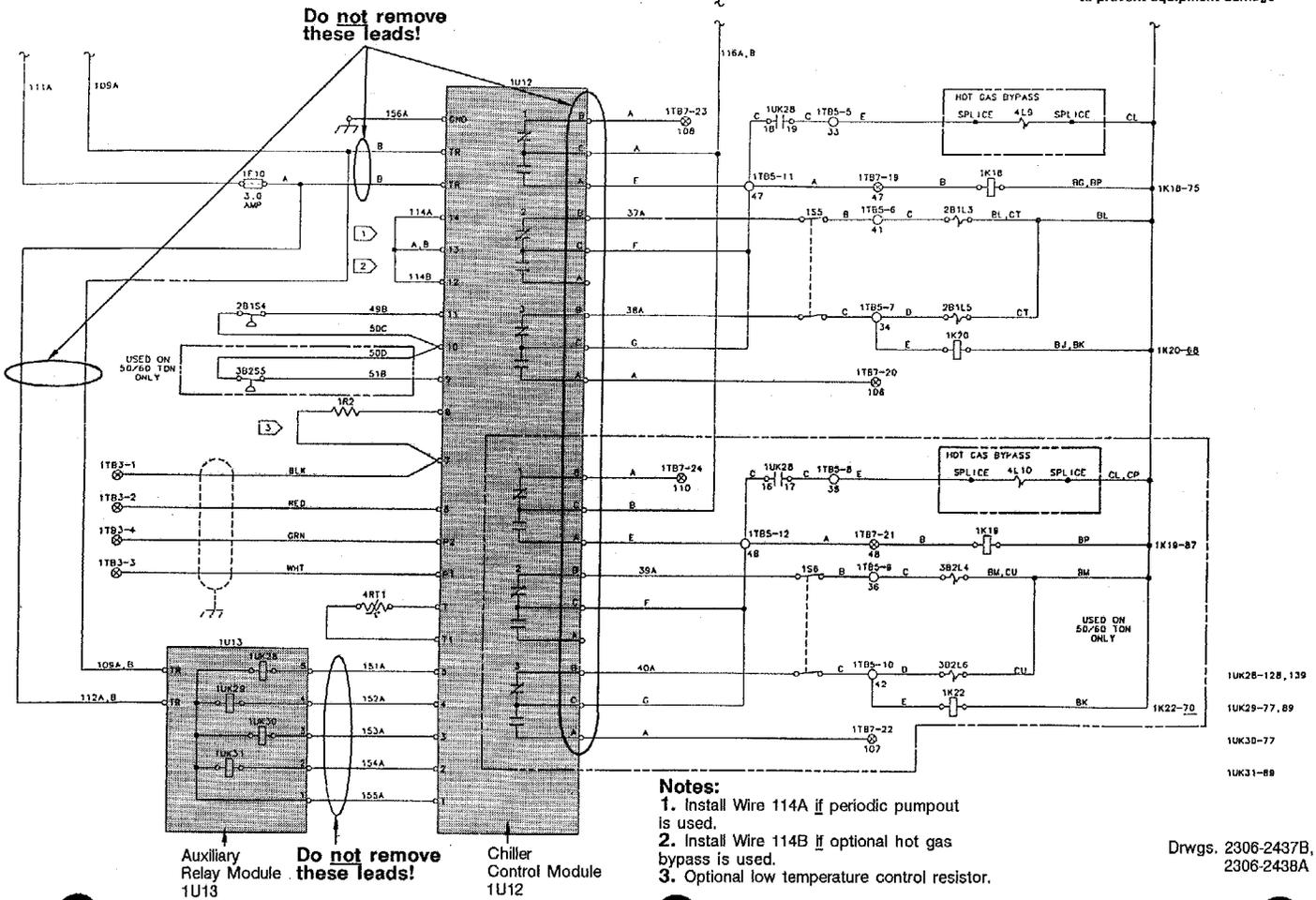
Figure 2
Typical 1U12 Control Module Schematic
for Units with 3- or 6-Step Control



Disconnect Wires 116A and 116B here.

WARNING
DISCONNECT ELECTRICAL POWER
SOURCE TO PREVENT INJURY OR
DEATH FROM ELECTRICAL SHOCK

CAUTION
Use copper conductors only
to prevent equipment damage



Do not remove these leads!

Do not remove these leads!

Auxiliary Relay Module 1U13

Chiller Control Module 1U12

- Notes:**
1. Install Wire 114A if periodic pumpout is used.
 2. Install Wire 114B if optional hot gas bypass is used.
 3. Optional low temperature control resistor.

Drwgs. 2306-2437B,
 2306-2438A

- 1UK28-128, 139
- 1UK29-77, 89
- 1UK30-77
- 1UK31-88

8. At this time, all output relays on the chiller control and auxiliary relay modules should be in their de-energized state; measure the resistance across all relay contact terminals to verify that this is true. (On auxiliary relay module 1U13, all contacts should be open except between Terminals 12 and 13.)

If any of the relay contacts are not in the correct state, the component on which that relay is mounted must be replaced.

Caution: Complete the following instructions in the order given. If any step is completed out of sequence, the entire test must be repeated from the beginning.

9. Turn the "Leaving Fluid Setpoint" knob on chiller control module 1U12 to the full counterclockwise position.

10. Momentarily short chiller control Terminals P1 to T1; the No. 1 LED of "Compressor 1" should light.

If this does not occur, remove and reinsert the diagnostic plug (TOL-101); then repeat Step 10. If the "Compressor 1, No. 1" LED still fails to energize, replace chiller control module 1U12.

11. Slowly rotate the "Leaving Fluid Setpoint" knob clockwise, pausing at least 10 seconds at each setting listed below. As the dial is rotated up through the "Leaving Fluid Setpoint" temperature settings, the remaining LEDs will light at the the points indicated. (Remember that the "Compressor 1: No. 1" LED is already on; see Step 10.)

Lvg. Fluid Setpoint Dial Setting	Energizes LED
46 ± 2 F	Comp. 1 - No. 2
58 ± 2 F	Comp. 1 - No. 3
70 ± 2 F	Comp. 2 - No. 1
82 ± 2 F	Comp. 2 - No. 2
94 ± 2 F	Comp. 2 - No. 3

If the LEDs fail to light when indicated above, replace chiller control module 1U12.

12. Slowly rotate the "Leaving Fluid Setpoint" knob counterclockwise, pausing at each setting given in Step 11. Each LED will go off in turn, reversing the sequence listed in Step 11. Note, however, that the "Compressor 1: No. 1" LED will not go out when the dial is returned to the full counterclockwise position.

13. Turn the "Design Δ T" knob to the full counterclockwise position.

14. Momentarily short chiller control Terminals P2 to T1; the No. 1 LED of "Compressor 1" should remain lit.

If this does not occur, replace chiller control module 1U12.

15. Slowly rotate the "Design Δ T" knob clockwise, pausing at least 10 seconds at each setting listed below. As the dial is rotated up through the "Design Δ T" temperature settings, the remaining LEDs will light at the points indicated. (Remember that the "Compressor 1, No. 1" LED is already on; see Step 14.)

Design Δ T Dial Setting	Energizes LED
5.6 ± 1 F	Comp. 1 - No. 2
8.8 ± 1 F	Comp. 1 - No. 3
12.0 ± 1 F	Comp. 2 - No. 1
15.2 ± 1 F	Comp. 2 - No. 2
18.4 ± 1 F	Comp. 2 - No. 3

If the LEDs fail to light when indicated above, replace chiller control module 1U12.

16. Slowly rotate the "Design Δ T" knob counterclockwise, pausing at each setting given in Step 15. Each LED will go off in turn, reversing the sequence listed in Step 15. Note, however, that the "Compressor 1: No. 1" LED will not go out when the dial is returned to the full counterclockwise position.

17. Turn the "Number of Stages" knob to the full counterclockwise position.

18. Momentarily short chiller control Terminals P1 to T1; the "Compressor 1: No. 1" LED remains lighted and the "Compressor 1: No. 2" LED should also light.

If this does not occur, replace chiller control module 1U12.

19. Slowly rotate the "Number of Stages" knob clockwise, pausing at least 10 seconds at each setting listed below. As the dial is rotated up through the "Number of Stages" settings, the remaining LEDs will light at the points indicated. (Remember that the "Compressor 1: No. 1" and "Compressor 1: No. 2" LEDs are already on; see Step 18.)

Number of Stages Dial Setting	Energizes LED
3	Comp. 1 - No. 3
4	Comp. 2 - No. 1
6	Comp. 2 - No. 2 & 3

If the LEDs fail to function in this manner, replace chiller control module 1U12.

20. Slowly rotate the "Number of Stages" knob counterclockwise, pausing at each setting given in Step 19. Each LED will go off in turn, reversing the sequence listed in Step 19. Note, however, that the "Compressor 1: No. 1" and "Compressor 1: No. 2" LEDs will not go out when the dial is returned to the full counterclockwise position.

21. Momentarily short chiller control Terminals T to T1; the "Compressor 1: No. 1" LED remains lighted, but the "Compressor 1: No. 2" LED should go out.

Measure the voltage between Terminals 1 and 4 on chiller control module 1U12; the reading obtained should be 9 to 13 VDC.

If the LEDs do not function properly—or if the voltage reading is not within the specified range, replace chiller control module 1U12.

22. Short chiller control Terminals 6 to 7 for 5 seconds; the No. 2 and No. 3 LEDs of "Compressor 2" should light, and the "Compressor 1: No. 1" LED should turn off.

If this does not occur, replace chiller control module 1U12.

23. Momentarily connect a resistor (rated between 100 and 1000 ohms, and supplied with TOL-101) across chiller control Terminals 7 and 8. Maintain this connection for at least 5 seconds. All 6 of the main control LEDs should light.

All control relay contacts should also switch at this time; measure the resistance across the relay contact terminals to verify that this occurred.

If any of the main control LEDs do not light—or if any of the control relay contacts do not switch, replace chiller control module 1U12.

24. Short chiller control Terminals 9 to 10 for 5 seconds; all but the No. 3 LED of "Compressor 2" should turn off at this time.

Measure the voltage between Terminals 1 and 2 on chiller control 1U12; the reading obtained should be 9 to 13 VDC.

If the LEDs do not function properly—or if the voltage reading is not within the specified range, replace chiller control module 1U12.

25. Short chiller control Terminals 10 to 11 for 5 seconds; the No. 3 LED of "Compressor 1" should light and the No. 3 LED of "Compressor 2" should turn off at this time.

Measure the voltage between Terminals 1 and 3 on chiller control module 1U12; the reading obtained should be 9 to 13 VDC.

If the LEDs do not function properly—or if the voltage reading is not within the specified range, replace chiller control module 1U12.

26. Short chiller control Terminals 12 to 13 for 5 seconds; the No. 2 LEDs of both "Compressor 1" and "Compressor 2" should light and the No. 3 LED of "Compressor 1" should turn off at this time.

Measure the voltage between Terminals 1 and 5 on chiller control module 1U12; the reading obtained should be 9 to 13 VDC.

If the LEDs do not function properly—or if the voltage reading is not within the specified range, replace chiller control module 1U12.

27. Short chiller control Terminals 13 to 14 for 5 seconds; the No. 1 LED of "Compressor 2" should light and the No. 2 LEDs of both "Compressor 1" and "Compressor 2" should turn off.

If this does not occur, replace chiller control module 1U12.

All of the relays on auxiliary relay module 1U13 should also pull in at this time; measure the resistance across the relay contact terminals to verify that this has occurred.

If the resistance measured across the relay terminals indicates that any of the relays have not pulled in, measure the DC voltage between the following pairs of auxiliary relay module terminals:

- a. Terminal 1 (Common) and Terminal 2 (LP2);
- b. Terminal 1 (Common) and Terminal 3 (LP1);
- c. Terminal 1 (Common) and Terminal 4 (LTC); and,
- d. Terminal 1 (Common) and Terminal 5 (HGB).

In each instance (Steps 27a through 27d), the reading obtained should be 9 to 13 VDC.

If any of the voltages measured in Steps 27a through 27d is higher than 13 VDC, replace chiller control module 1U12. However, if all of the voltages measured are lower than 13 VDC but 1 or more of the relays have not closed, replace auxiliary relay module 1U13.

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W7900 Diagnostic Tips:

A. If the W7900 chiller control module (1U12) is not grounded properly, unit operation is shut down by a low temperature control (LTC) lockout.

B. If the DC voltages measured between 1U12 Terminals 1-2, 1-3, 1-4 and 1-5 are less than 0.5 VDC—and the DC voltages measured between auxiliary relay module 1U13 Terminals 1-2, 1-3, 1-4 and 1-5 are greater than 15 VDC, a bad electrical connection exists between Terminal 1 on 1U12 and Terminal 1 on 1U13.

C. During operation, a voltage reading of less than 13 VDC between auxiliary relay module (1U13) Terminals 1-2, 1-3, 1-4 or 1-5 indicates that the corresponding relay is energized—and that its contacts should have reversed position. A voltage reading in excess of 15 VDC between any of these 1U13 terminal pairs indicates that the corresponding relay has not energized.

W7901 Checkout Procedure

Use the checkout procedure that follows to troubleshoot the operation of the W7901 control module used in MUAA and MUWA multiple-unit control panels designed for reciprocating liquid chiller applications.

Note: Substitute this procedure for the one published in MUAA-IOM-1A. (Notice that the W7901 is identified as "multiple-unit controller 4U14" in this manual.)

Multiple-Unit Chiller Control (4U14) Test Procedure

To determine whether or not the multiple-unit controller (W7901, or "4U14") is functioning properly, perform the checkout procedure outlined below. Required tools include a highly accurate, digital volt-ohmmeter and an accessory resistor-and-test-plug kit (Trane part no. TOL-0101).

Note: If necessary, "Decade Box" resistance selector (Trane part no. TOL-0099 or equivalent) can be substituted for the resistors provided with TOL-0101. Both TOL-0101 and TOL-0099 are available from stock location "51" in La Crosse.

1. De-energize the control panel.

WARNING: To prevent injury or death due to electrical shock, disconnect power external to the panel.

2. Open the main power disconnect of each chiller in the system.
3. Remove the red diagnostic port cover from the bottom of multiple-unit controller 4U14 and insert the diagnostic plug from TOL-0101.
4. Remove the wires connected to 4U14 Terminals 9, 10, 11, 12, 13 and 14; if applicable, remove the jumper connected between 4U14 Terminals 1 and P1, too. See Figure 3.
5. Verify that the MUAA/WA panel's system switch (4S9) is set at RUN, and that service switch 4S8 is set at CONTROLLER ON.
6. Energize the multiple-unit control panel and observe the LED indicator lights; none of the LEDs should be illuminated at this time.
7. Measure the power supply voltage between the 24 VAC input terminals (i.e., Terminals TR and TR) on multiple-unit controller 4U14; the reading obtained should be 25 ± 5 VAC.

WARNING: Use care when measurements or adjustments must be made with the power on to prevent injury or death due to electrical shock.

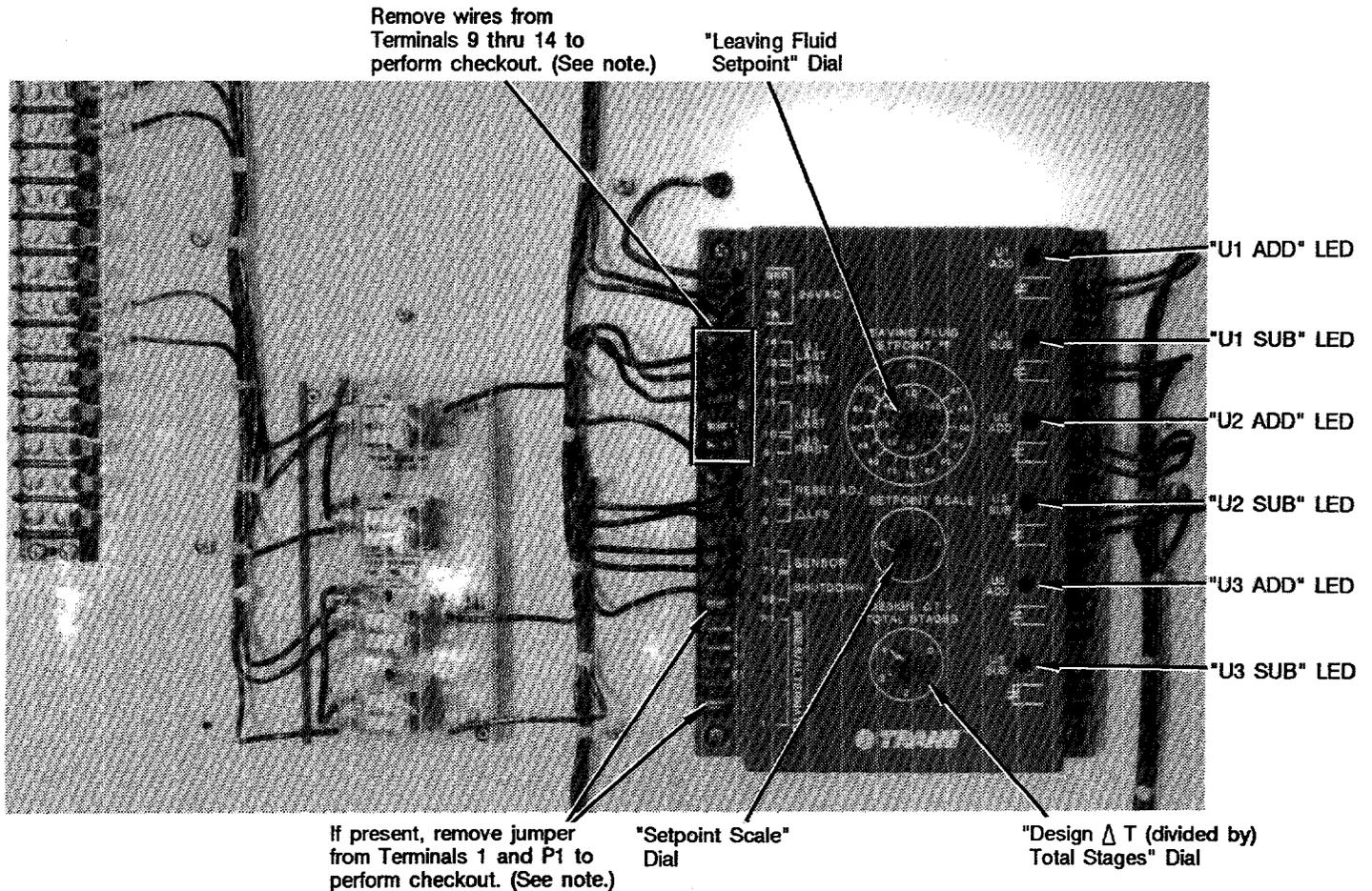
If the power supply voltage does not fall within the acceptable range, check for a defective fuse or 24 VAC transformer.

8. At this time, all output relays on 4U14 should be in their de-energized state (closed); measure the resistance across all relay contact terminals on 4U14 to verify that this is true.

If any of the relay contacts are not closed, replace multiple-unit controller 4U14.

Caution: Complete Steps 9 through 26 in the exact order indicated. If a mistake is made, remove the diagnostic plug from 4U14 and reinsert it; then repeat the test from the beginning.

Figure 3
Multiple-Unit Controller 4U14
(W7901)



Note: If the W7901 module checks out okay, be sure to reconnect the appropriate wires to Terminals 9, 10, 11, 12, 13 and 14; reinstall the jumper between Terminals 1 and P1, if applicable.

9. Turn the "Leaving Fluid Setpoint" knob on multiple-unit controller 4U14 (Figure 3) to the full counterclockwise position.

10. Momentarily short 4U14 Terminals P1 to T1; the "U1 ADD" LED should light.

If this does not occur, remove and reinsert the diagnostic plug (TOL-101); then repeat Step 10. If the "U1 ADD" LED still fails to energize, replace multiple-unit controller 4U14.

11. Slowly rotate the "Leaving Fluid Setpoint" knob clockwise, pausing at least 10 seconds at each setting listed below. As the dial is rotated up through the "Leaving Fluid Setpoint" temperature settings, the remaining LEDs will light at the points indicated.

Lvg. Fluid Setpoint Dial Setting	Energizes LED
40 ± 5 F (full CCW)	U1 ADD (already on)
50 ± 5 F	U1 SUB
60 ± 5 F	U2 ADD
70 ± 5 F	U2 SUB
80 ± 5 F	U3 ADD
90 ± 5 F	U3 SUB

If the LEDs fail to light when indicated above, replace multiple-unit controller 4U14.

12. Slowly rotate the "Leaving Fluid Setpoint" knob counterclockwise, pausing at each setting given in Step 11. Each LED should go off in turn, reversing the sequence listed in Step 11. Note, however, that the "U1 ADD" LED will not go out when the dial is returned to the full counterclockwise position (i.e., 40 F).

13. Turn the "Design Δ T (divided by) Total Stages" knob to the full counterclockwise position.

14. Momentarily short 4U14 Terminals P2 to T1; the "U1 ADD" LED should remain lit.

If this does not occur, replace multiple-unit controller 4U14.

15. Slowly rotate the "Design Δ T (divided by) Total Stages" knob clockwise, pausing at least 10 seconds at each setting listed below. As the dial is rotated through each setting, the corresponding LED (indicated below) should light. (Remember that the "U1 ADD" LED is already on; see Step 14.)

Design Δ T (divided by) Total Stages Dial Setting	Energizes LED
0 (full CCW)	U1 ADD (already on)
1	U1 SUB
2	U2 ADD
3	U2 SUB
4 (full CW)	U3 ADD

If the LEDs fail to light when indicated above, replace multiple-unit controller 4U14.

16. Slowly rotate the "Design Δ T (divided by) Total Stages" knob counterclockwise, pausing at least 10 seconds at each setting listed below. As the dial is rotated through each setting, the corresponding LED (indicated below) should go out. Note, however, that the "U1 ADD" LED will not go out when the dial is returned to the full counterclockwise position (i.e., 0).

Design Δ T (divided by) Total Stages Dial Setting	De-energizes LED
4 (full CW)	-----
3	U3 ADD
2	U2 SUB
1	U2 ADD
0 (full CCW)	U1 SUB

If the LEDs fail to go out when indicated above, replace multiple-unit controller 4U14.

17. Turn the "Setpoint Scale" knob to the "HI" position.

18. Momentarily short 4U14 Terminals P1 to T1; the "U1 ADD" LED should remain lit and the "U1 SUB" LED should light.

If this does not occur, replace multiple-unit controller 4U14.

19. Turn the "Setpoint Scale" knob to the "LO" position. The "U1 SUB" LED should go out and the "U1 ADD" LED should remain lit.

If this does not occur, replace multiple-unit controller 4U14.

20. Momentarily short 4U14 Terminals T to T1; the "U1 ADD" LED should remain lit.

21. Short 4U14 Terminals 6 to 7 for 5 seconds; the "U3 ADD" and "U3 SUB" LEDs should light.

If this does not occur, replace multiple-unit controller 4U14.

22. Momentarily connect a resistor (rated between 100 and 1000 ohms, furnished with TOL-0101) across 4U14 Terminals 7 and 8. Maintain this connection for at least 5 seconds. All 6 of the main control LEDs should light.

Also, all 4U14 output relay contacts should open at this time. Measure the resistance across the relay contact terminals to verify that this occurred.

23. Short 4U14 Terminals 9 to 10 for 5 seconds; only the "U3 SUB" LED should light at this time.

If this LED does not illuminate, replace multiple-unit controller 4U14.

24. Short 4U14 Terminals 11 to 10 for 5 seconds; the "U2 ADD" LED should light at this time.

If this LED does not illuminate, replace multiple-unit controller 4U14.

25. Short 4U14 Terminals 12 to 13 for 5 seconds; both the "U1 SUB" and "U3 ADD" LEDs should light at this time.

If these LEDs do not illuminate, replace multiple-unit controller 4U14.

26. Short 4U14 Terminals 13 to 14 for 5 seconds; the "U2 SUB" LED should light at this time.

If this does not occur, replace multiple-unit controller 4U14.

* * * * *

To operate the system chillers in the event that multiple-unit controller 4U14 is defective, remove (and insulate) the leads connected to Terminals P1 and P2 on the 1U12 module in each unit's control panel. This allows the chillers to operate independently from the multiple-unit sequence panel if system parameters are correctly established at the individual chiller controls.

If the multiple-unit controller checks out okay and the chillers are operating normally except that they lock out at start-up, check the 115-volt feedback circuit(s) between the chiller control panel(s) and the feedback module relays (4U15, 4U16) of the multiple-unit sequence panel.

Checkout Procedure for W7900/W7901 Leaving Chilled Water Temperature Sensor

An open or shorted sensor (as well as an actual leaving water temperature sensor outside the sensor's designed operating range) will cause the control system to shut down.

To determine whether or not the sensor is functioning properly:

1. Disconnect the leads of the leaving water temperature sensor from Terminals T and T1 on the W7900 or W7901 module, as applicable.

WARNING: To prevent injury or death due to electrical shock, disconnect power external to the panel.

2. Measure the resistance across the sensor leads; then compare this reading with the values in the resistance-to-temperature conversion chart shown below.

<u>Measured Resistance Across Sensor Leads</u>	<u>"Converted" Temperature</u>
3516.2 ohms	90 F
3498.2 ohms	80 F
3450.0 ohms	70 F
3401.8 ohms	60 F
3353.4 ohms	50 F
3304.8 ohms	40 F
3256.3 ohms	30 F
3207.5 ohms	20 F
3159.7 ohms	10 F
3109.7 ohms	0 F

3. Compare the "converted temperature" value determined in Step 2 with the actual leaving water temperature. If the measured resistance is not within ± 5 ohms of the actual leaving water temperature, the sensor is out of range and must be replaced.

For further information on this product or other Trane products, refer to the "Trane Service Literature Catalog", ordering number IDX-IOM-1. This catalog contains listings and prices for all service literature sold by Trane. The catalog may be ordered by sending a \$20.00 check to: The Trane Company, Service Literature Sales, 3600 Pammel Creek Road, La Crosse, WI 54601.