

GENERAL ELECTRIC

P3K-AL-0517-A01

CONT ON SHEET 2 SH NO. 1

REV NO. 1

TITLE

P3K-AL-0517-A01

TEST INSTRUCTIONS FOR PLANT COMMUNICATIONS
LOGIC (REMOTE AUTO CONTROL INTERFACE)

CONT ON SHEET 2 SH NO. 1

FIRST MADE FOR EHC MARK II (PLANT COMMUNICATIONS)

REVISIONS

I. SCOPE

This instruction outlines the specifications for testing the Plant Communications Logic board LPC2-C102, originally made for BWR-6 units.

CIRCUIT BOARD 133D6371 --- REMOTE AUTO CONTROL INTERFACE

II. CIRCUIT DESCRIPTION

1. When the power to the EHC control system is initially turned on, the unit will be in a TRIPPED condition with the circuit breaker open. The circuit breaker OPEN lights will be lit, if the disconnect switch is closed. Several circuits are supplied with circuit breaker open indication. Normally all other functions will be off or neutral.
2. Indication is furnished to Trip and Monitoring (TM) circuits of the presence of EHC 125 VDC to be supplied to the customer for his contacts to use to power EHC interface relays for the following functions ---
 - a. One load setback.
 - b. Grid isolation.
 - c. Remote speed match mode select.
 - d. Remote auto (RA) GO MANUAL.
 - e. Load set runback circuit.
3. The effect to EHC and the turbine-generator is the same if the disconnect switch is open or both circuit breakers are open. The circuit takes this into account. The same circuit board is used when the customer has only one circuit breaker. External connections take care of the differences.
4. Because of the EHC feature that Speed Control (S) locks into rated speed whenever the circuit breaker is closed, it is imperative that the circuit breaker condition signal get to S. Therefore no switch is inserted between 125 VDC power and these circuits.
5. Provides the 115 VAC connections to RA, remote operation RO and remote speed match (RSM) at the dictates of the mode selection.

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TEST INSTRUCTIONS FOR PLANT COMMUNICATIONS
LOGIC (REMOTE AUTO CONTROL INTERFACE)

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FIRST MADE FOR EHC MARK II (PLANT COMMUNICATIONS)

REVISIONS

II. CIRCUIT DESCRIPTION (continued)

6. Provide 125 VDC to 24 VDC logic interface for --
 - a. Customer RSM mode select.
 - b. Customer RA GO MANUAL.
 - c. Customer load set runback inputs.
 - d. Customer load setback.
 - e. Customer grid isolation.
7. The LAMP TEST diodes and resistors are included on the relay logic card. These logic circuits permit all of the lamps to be tested while the EHC system is in operation. A momentary pushbutton switch labeled LAMP TEST is located on the operating panel for checking the lamps.

III. CIRCUIT SPECIFICATIONS

1. Before the board is coated, each diode of the 8 pairs should be checked (using an ohmmeter) both in the forward and reverse direction to insure that redundancy is effective.
2. All functional tests shown in the Logic Testing Table can be made with the board coated as well as uncoated.
3. The symbols used in the Logic Testing Table are as follows:

TABLE SYMBOLS

- 0 = No voltage applied, or absence of voltage at output terminals and test points, or light off.
- 1 = Power applied to power input terminals, or presence of power at output terminals and test points, or light on.
- J = Jumper the two terminals indicated.

Omission = No change from previous test condition.

4. Before applying power to the circuit board, perform the following continuity checks:

CONTINUITY: Terminals 1 to 3 to 4 to 20 to 29 to 36
6 to 7 to 8 to 9
11 to 12
21 to 22
33 to 34
37 to 39 to 41 to 43

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TEST INSTRUCTIONS FOR PLANT COMMUNICATIONS
LOGIC (REMOTE AUTO CONTROL INTERFACE)

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SH NO.

4

FIRST MADE FOR EHC MARK II (PLANT COMMUNICATIONS)

REMOTE AUTO CONTROL INTERFACE LOGIC TESTING TABLE

(TEST IN SEQUENCE SHOWN)

REVISIONS

TABLE CONTINUED ON NEXT PAGE

| Step No. | FUNCTION UNDER TEST | POWER INPUTS | | | | JUMPERS | | | | POWER OUTPUTS | | | | LAMPS | | | | |
|----------|--|----------------------|--------------|-----------|---------------------|-----------------|-----------------|-------------------|-------------------|----------------|--------------------------------|---------------------------|-------------------|---------------------|-------------------|---------------------|----|----|
| | | Rated Speed not Sel. | System reset | Lamp Test | Disconnect sw. open | #1 breaker open | #2 breaker open | RSM mode selected | Permission to RSM | Ckt. bkr. open | Reset and ckt. bkr. open to S. | No customer control power | #1 ckt. bkr. open | #1 ckt. bkr. closed | #2 ckt. bkr. open | #2 ckt. bkr. closed | | |
| | | 10 | 11 | 14 | 39 | 41 | 43 | 53 | | 5 | 6 | 13 | 20 | | 23 | 24 | 25 | 26 |
| 1 | All power off | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| 2 | Disconnect sw. open | 1 | | | J | | | | | | 1 | | 1 | | | | | |
| 3 | System Reset | | 1 | | | | | | | | | 1 | | | | | | |
| 4 | Lamp Test | | | 1 | | | | | | | | | | | 1 | 1 | 1 | 1 |
| 5 | Disconnect sw. closed, ckt. bkrs. open | | | 0 | 0 | J | J | | | | | | | | | 0 | | 0 |
| 6 | RSM selected | | | | | | | J | | | | | | | | | | |
| 7 | Rated Speed selected | 0 | | | | | | | | 1 | | | | | | | | |
| 8 | #1 ckt. bkr. closed | | | | | 0 | | 0 | | 0 | 0 | 0 | | | 0 | 1 | | |
| 9 | #2 ckt. bkr. closed | | | | | J | 0 | | | | | | | | 1 | 0 | 0 | 1 |
| 10 | Both ckt. bkrs. closed | | | | | 0 | | | | | | | | | 0 | 1 | | |

During the above tests there should be no power on any other terminals.
Leave the circuit powered as in Step #10 and proceed to next test.

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LOGIC (REMOTE AUTO CONTROL INTERFACE)

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SH NO.

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FIRST MADE FOR EHC MARK II (PLANT COMMUNICATIONS)

REVISIONS

TEST POINTS

(TABLE CONTINUED FROM PREVIOUS PAGE)

| TP50 | TP51 | TP52 | TP53 | TP54 | TP55 | TP56 | TP57 |
|------|------|------|------|------|------|------|------|
| 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | |
| | | | | | | | |
| 1 | | 1 | | 1 | | 1 | |
| | | | | | | | |
| 1 | | | | | | | |
| 0 | 0 | 0 | | 0 | 1 | | |
| 1 | | 1 | | 1 | 0 | 0 | 1 |
| 0 | | 0 | | 0 | 1 | | |

Step No.

1
2
3
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7
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10

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SH NO.

5

CODE IDENT NO.

GENERAL ELECTRIC

P3K-AL-0517-A01

REV. NO. 7

TITLE

CONT ON SHEET 7

SH NO. 6

P3K-AL-0517-A01

TEST INSTRUCTIONS FOR PLANT COMMUNICATIONS
LOGIC (REMOTE AUTO CONTROL INTERFACE)

CONT ON SHEET 7

SH NO. 6

FIRST MADE FOR EHC MARK II (PLANT COMMUNICATIONS)

REVISIONS

| Step No. | FUNCTION UNDER TEST | RA POWER | | JUMPERS | | | | POWER OUTPUTS | | | | | |
|----------|-------------------------------|----------|----------------|--------------|----------------|------------------|------------------|------------------|--------------|----------------|----------------|--------------|-----------------------|
| | | +125 VDC | 125 VDC common | Load setback | Grid isolation | Runback decrease | Increase prevent | RA +125 VDC lost | Load setback | Grid isolation | Grid isolation | Load runback | Load increase prevent |
| | | 62 | 61 | 45 | 47 | 57 | 57 | 20 | 27 | 28 | 29 | 31 | 32 |
| 11 | Put RA power on | 1 | 1 | | | | | 0 | | | 1 | | |
| 12 | Load setback | | | J | | | | | 1 | | | | |
| 13 | Grid isolation | | | 0 | J | | | | 0 | 1 | 0 | | |
| 14 | Load runback decrease | | | | 0 | J | | | | 0 | 1 | 1 | |
| 15 | Load runback increase prevent | | | | | 0 | J | | | | | 0 | 1 |
| 16 | Clear | | | | | | 0 | | | | | | 0 |

Leave the ckt. powered as in step #16 and proceed to next test.

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SH NO. 6

GENERAL ELECTRIC

P3K-AL-0517-A01

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TITLE

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8 SH NO. 7

P3K-AL-0517-A01

TEST INSTRUCTIONS FOR PLANT COMMUNICATIONS
LOGIC (REMOTE AUTO CONTROL INTERFACE)

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FIRST MADE FOR EHC MARK II (PLANT COMMUNICATIONS)

REVISIONS

| Step No. | FUNCTION UNDER TEST | POWER INPUTS | | | 115VAC between terminals | JUMPERS | | | | | | | | +24 VDC output | 115VAC OUTPUT BETWEEN TERMINALS | | | | |
|----------|------------------------|-----------------|---------------|---------------|--------------------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------------|----------------|--|--------------|-------------|-------------|----------|
| | | RSM permission | RA permission | RO permission | | RA GO MANUAL | RSM increase | RSM decrease | RA increase | RA decrease | RO increase | RO decrease | Load set decrease | | Load set increase | RSM AC power | RA AC power | RO AC power | |
| | | 17 | 18 | 19 | | 63 64 | 55 56 | 67 68 | 68 69 | 71 72 | 72 73 | 75 76 | 76 77 | | 16 | 63 65 | 63 66 | 68 70 | 72 74 |
| 17 | 115VAC power on | | | | 1 | | | | | | | | | | | | | | |
| 18 | RSM permission | 1 | | | | | | | | | | | | | | 1 | | | |
| 19 | RSM increase | | | | | | J | | | | | | | | 1 | | | | |
| 20 | RSM decrease | | | | | | 0 | J | | | | | | | 1 | 0 | | | |
| 21 | RA permission | 0 | 1 | | | | | 0 | | | | | | | 0 | | 0 | 1 | |
| 22 | RA increase | | | | | | | | J | | | | | | | 1 | | | |
| 23 | RA decrease | | | | | | | | 0 | J | | | | | 1 | 0 | | | |
| 24 | RA GO MANUAL | | | | | J | | | | 0 | | | 1 | | 0 | | | | |
| 25 | RO permission | | 0 | 1 | | 0 | | | | | | | 0 | | | | | 0 | 1 |
| 26 | RO increase | | | | | | | | | | J | | | | | 1 | | | |
| 27 | RO decrease | | | | | | | | | | 0 | J | | | 1 | 0 | | | |
| 28 | Clear | | | 0 | 0 | | | | | | | 0 | | | 0 | | | | 0 |

Leave +125 VDC power on terminals 37 & 38 and proceed to next step.

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GENERAL ELECTRIC

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TITLE
TEST INSTRUCTIONS FOR PLANT COMMUNICATIONS
LOGIC (REMOTE AUTO CONTROL INTERFACE)
FIRST MADE FOR EHC MARK II (PLANT COMMUNICATIONS)

CONT ON SHEET 9 SH NO. 8

REVISIONS

| Step No. | FUNCTION UNDER TEST | POWER INPUTS | | | | Jumpers | | POWER OUTPUTS | | | Test Points |
|----------|----------------------|--------------|--------|------------------|------------------|----------|----------|---------------|-------------|----------------|-------------|
| | | +24 VDC | 24 VDC | SPL Inc. from RO | SPL Dec. from RO | SPL Inc. | SPL Dec. | Inc. to SPL | Dec. to SPL | SPL Permission | |
| | | 1 | 2 | 21 | 33 | 79 | 80 | 22 | 34 | 36 | TP53 |
| 29 | +24 VDC Power Off | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | +24 VDC Power On | 1 | 1 | | | | | | | 1 | |
| 31 | +24 VDC from RO Inc. | | | 1 | | | | 1 | | 0 | 1 |
| 32 | Remove RO Inc. | | | 0 | | | | 0 | | | |
| 33 | Remove power | 0 | | | | | | | | | 0 |
| 34 | Reapply Power | 1 | | | | | | | | 1 | |
| 35 | +24 VDC from RO Dec. | | | | 1 | | | | 1 | 0 | 1 |
| 36 | Remove RO Dec. | | | | 0 | | | | 0 | | |
| 37 | SPL Inc. | | | | | J | | 1 | | | |
| 38 | SPL Dec. | | | | | 0 | J | 0 | 1 | | |
| 39 | SPL Clear | | | | | 0 | | | 0 | | |
| 40 | Remove power | 0 | | | | | | | | | 0 |
| 41 | Reapply Power | 1 | | | | | | | | 1 | |
| 42 | Clear | 0 | 0 | | | | | | | 0 | |

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CONT ON SHEET - SH NO. 9

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TEST INSTRUCTIONS FOR PLANT COMMUNICATIONS
LOGIC (REMOTE AUTO CONTROL INTERFACE)
FIRST MADE FOR EHC MARK II (PLANT COMMUNICATIONS)

REVISIONS

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DATE

Apr. 1/1976

G.W. Kessler
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APPROVED BY

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DATE

9-12-77

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TEST PROCEDURE
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