NTP 297-3601-850

DMS-10 Family

600-Series Generics

J2419 Power Plant Description, Operation, and Maintenance

28.01

For Generic 602.20   Standard   August 2006

NORTEL

DMS-10 Family

600-Series Generics

J2419 Power Plant Description, Operation, and Maintenance

Nortel Publications: NTP 297-3601-850
28.01
For Generic 602.20
Standard
August 2006

Printed in the United States of America.

Publication history

Issue	Date	Rating	For generic
Issue A	FEB 14, 1990	Preliminary	404.2x
Issue B	JUL, 1990	Preliminary	404.2x
Issue 1	SEP, 1990	Standard	404.3x
Issue 2	JUN, 1991	Standard	404.4x
Issue 3	DEC, 1991	Preliminary	405.1x
Issue 4	MAR, 1992	Standard	405.1x
Issue 5	JUL, 1992	Preliminary	405.20
Issue 6	AUG, 1992	Standard	405.20
Issue 7	DEC, 1992	Preliminary	405.21
Issue 8	JAN, 1993	Standard	405.21
Issue 9	AUG, 1993	Preliminary	406.10
Issue 10	SEP, 1993	Standard	406.10
Issue 11	APR, 1994	Preliminary	406.20
Issue 12	SEP, 1994	Standard	406.20
Issue 13	FEB, 1995	Standard	406.21
Issue 14	FEB, 1995	Preliminary	407.10
Issue 15	APR, 1995	Standard	407.10
Issue 16	SEP, 1995	Preliminary	408.10
Issue 17	NOV, 1995	Standard	408.10
Issue 18	AUG, 1996	Preliminary	409.10
Issue 19	OCT, 1996	Standard	409.10
Issue 20	MAR, 1997	Standard	410.10
Issue 21.01	JUL, 1997	Preliminary	410.10
Issue 21.02	SEP, 1997	Standard	410.10
Issue 25.02	SEP, 1999	Standard	412.20
Issue 26.01	JUL, 2005	Preliminary	601.10
Issue 26.01	AUG, 2005	Standard	601.10

Issue	Date	Rating	For generic
27.01	February 2006	Preliminary	602.10
27.01	March 2006	Standard	602.10
28.01	July 2006	Preliminary	602.20
28.01	August 2006	Standard	602.20

Contents

Section 1: Introduction

Introduction

The J2419 Power Plant has been designed as a modular supplement to the central office switching system, and functions to provide all of the -48 V power requirements.

The power plant consists of three major components:

- Control Bay
- Supplementary Bay
- Battery Module

The control bay houses the electronic controls and monitoring system, distribution fuses, and rectifiers (50-A or 100-A) for the central office equipment. The control bay is available in maximum configurations of 60, 200, 400, and 600 A. The number of rectifiers that will fit in a bay depends, in part, on their physical size, which varies depending on type and vendor.

Each supplementary bay can house either 50-A or 100-A rectifiers. This bay is added, as required, to provide additional charging capacity.

The battery module consists of lead antimony or lead calcium cells, and a two-tier, single-row battery stand. Sealed maintenance-free lead calcium cells are also available.

General configurations

Rectifier input options:

- single-phase, 120/208/240 Vac, 50-A, Ferroresonant rectifiers
- single-phase, 208/240 Vac, 100-A, Ferroresonant rectifiers
- single-phase, 208/230 Vac (183 to 264 Vac), 47-63 Hz, 50-A, switch-mode rectifiers
- single-phase, 208/230 Vac (183 to 264 Vac), 47-63 Hz, 100-A switch-mode rectifiers

- three-phase, 208/230 Vac (183 to 264 Vac), 47-63 Hz, 100-A switch-mode rectifiers

Battery module options:

- See Table 4-B for battery types. The Ampere-hour rating is job-engineered for four times the total rectifier charge capacity.

The basic configuration includes the following:

- dual-breakered circuits up to 225A (low-voltage alarm trip activated)
- 15A breakered Alarm Battery Supply (ABS) circuit source

The output noise is 30dBrnC maximum.

Any one of the following four distribution output options may be initially configured:

- 0-60 A, maximum total
- 0-200 A, maximum total
- 0-400 A, maximum total
- 0-600 A, maximum total

Any two of the following four circuit panels may be configured:

- twelve 30-A miscellaneous alarm-fused circuits
- two 60-A and eight 30-A miscellaneous alarm-fused circuits
- two 60-A and three 30-A miscellaneous alarm-fused circuits
- sixteen 30-A miscellaneous alarm-fused circuits (low-voltage alarm disconnect)

The Power Plant Controller can:

- accommodate up to twelve rectifiers
- provide metering of battery voltage
- provide metering of total plant discharge current
- provide for external monitoring of discharge currents of miscellaneous load groups
- provide independent adjustment of low-voltage, low-float, high-float, and
- high-voltage alarm thresholds (see Table 4-B for settings)
- generate major and minor rectifier alarms
- control automatic recharge circuit and low-voltage disconnect circuit

Reference documents

The following documents should be referred to:

- SD0T01-04 DMS-10 System Application Schematic (400-series DMS-10)
- SD0T01-11 DMS-10 System Application Schematic (500-series DMS-10)
- SD0T01-15 CS 1500 System Application Schematic
- J2419A-1 Power Plant Bay
- J8T44A-1, J8T44C-1, J8T44E-1 Power Plant Bays
- J2419AA-1 Power Plant Control Panel
- J2419AA-2 Power Plant Control Panel
- ED2419-50 Fuse and Breaker Panels
- J1T01A-1 Breaker Panel
- SD2419-01 Power Plant Charge/Discharge Circuit
- SD3T62AA, SD3T62AB Power Monitor and Control
- CD2419-01 Power Plant Circuit Description (includes CD3T62AA and CD3T62AB)

For additional information about the theory, installation, operation, and maintenance of enclosed, lead-acid storage batteries, refer to battery vendor documentation.

For information about the various J2419 Power Bay configurations, refer to the Lists provided in the J2419A-1, J8T44A-1 (300-series style frame), J8T44C-1 (66-inch frame), and J8T44E-1 (400-series style frame) drawings.

Alarms

The following alarms are available at the J2419AA Power Plant Control Panel and can be extended to the central office alarm monitoring facility:

- high voltage (HV)
- low voltage (LV)
- high float voltage (HF)
- low float voltage (LF)
- alarm battery fuse
- miscellaneous discharge fuse(s)
- loss of ac input to one rectifier (minor alarm)
- loss of ac input to more than one rectifier (major alarm)
- loss of dc output from one rectifier (minor alarm)

- loss of dc output from more than one rectifier (major alarm)

Grounding

The Power Plant Bay must be grounded as depicted on Sheet B1 of the SD0T01-*nn* System Application Schematic Drawings. Refer also to NTP 297-3401-187, NTP 297-3501-187, or NTP 297-3102-187 *Grounding System*, for additional information.

Section 2: Circuit Description

Introduction

The self-regulated rectifiers are connected to the battery terminals by way of a common, unfused charge bus. The individual battery rectifier sensing inputs, RC*n* and RG*n*, are collected and then supplied on separate leads (+SENSE and -SENSE) directly to the battery terminals.

Rectifier failure alarm

When a battery charger fails (loss of dc or ac), a ground potential signal is provided by way of leads AC-OFF or DC-OFF to terminals 26, 24, 22, 20, 18, 16, 14, 12, 10, 8, 6, 4 for AC-OFF, or to terminals 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25 for DC-OFF, of terminal strip J1-1 on the J2419AA monitor and control panel. A failed rectifier, regardless of the nature of the fault, is reported as a minor alarm through a loop closure contact on terminals 1 and 2 for AC Minor, or 7 and 8 for DC Minor, of J2419AA terminal strip J1-2. If one rectifier has failed and a second rectifier fails, a major alarm is reported as a loop closure contact on terminals 3 and 4 for AC Major, or 5 and 6, for DC Major, of terminal strip J1-2. The AC Min, DC Min, AC Maj, or DC Maj LED lights indicate the failure mode.

Fuse failure alarm

If any control or discharge alarm fuse fails, battery is supplied to J2419AA terminal 27 of terminal strip J1-2, and a fuse alarm is reported as a loop closure contact on terminals 9 and 10 of terminal strip J1-2. In addition, the FA LED lights.

High-voltage alarm

If the discharge voltage exceeds the predetermined value, after a short time delay (approximately one second), the HV alarm circuit elicits a high-voltage alarm by means of a loop closure contact between terminals 12 and 13 of terminal strip J1-2. The HV LED lights. The high-voltage alarm circuit also connects ground to the HVS leads on terminal 11 of terminal strip J1-2. This terminal is connected to each rectifier if the rectifiers are equipped with a selective shutdown input.

Low-voltage alarm

If the discharge voltage falls below the adjusted predetermined value, then after a short time delay (approximately one second), the LV alarm circuit elicits a low-voltage alarm by means of a loop closure contact between terminals 15 and 16 of terminal strip J1-2. The LV LED lights. The low-voltage alarm circuit also connects ground over the LV trip lead on terminal 14 of terminal strip J1-2 to activate the disconnect of load A and B under a low-battery voltage condition.

High and low float alarm

If the rectifiers do not provide sufficient capacity to maintain the battery above the low float limit, a minor alarm is activated through a loop closure contact between terminals 19 and 20 of terminal strip J1-2. The LF LED lights. The low float alarm circuit also initiates the automatic recharge circuit. Should a fault condition in the rectifiers cause the voltage on the regulator busbars to exceed the high float limit, a minor alarm will be activated through a loop closure contact between terminals 17 and 18 of terminal strip J1-2. The HF LED lights. If the trouble condition in the rectifier continues, and voltage reaches high-voltage, a ground over the HVS lead to each rectifier will provide selective shutdown of a failed rectifier.

Enable/disable alarm

When the Enable/Disable (ENB/DIS) switch is in the DIS position, all alarms, with the exception of the fuse alarm, are cut off. While the ENB/DIS switch is in the DIS position, no subsequent alarm will be transmitted until the initial alarm condition has been corrected and the ENB/DIS switch returned to the normal position. Operation of the ENB/DIS switch to the DIS position lights the DIS LED.

Alarm battery supply (ABS)

Alarm battery supply (ABS) is provided from the discharge bar by way of the ABS circuit breaker (CB3) to lead -48 ABS. Failure of this breaker transmits battery voltage by way of resistor R2 to lead ABSF.

Automatic recharge

At a low-float signal, the automatic recharge of the battery is accomplished by adding, in series, varistors RV1, RV2, and RV3, in the -SENSE lead. The period of time that the automatic charge should be ON is determined by the position of the equalize switches:

- EQL SW6 and EQL SW2 operated = approximately 1 hour, 22 minutes
- EQL SW6 and EQL SW3 operated = approximately 2 hours, 44 minutes
- EQL SW6 and EQL SW5 operated = approximately 5 hours, 28 minutes.

All other switches must be off. The automatic recharge circuit is reset to its normal position after time-out or after opening all equalize switches. Operation of EQL SW1 allows for testing of the automatic recharge circuit or manually starting the automatic recharge circuit.

Power distribution and load monitoring

Power distribution is provided to circuits A and B through circuit breakers CB A and CB B, respectively. The maximum carry current for each circuit is 150 A dc. Miscellaneous loads can be fed from miscellaneous fuse panels equipped on an optional basis. The maximum total current for miscellaneous loads is 300 A dc.

Load monitoring is available on an optional basis by adding shunts between the discharge bar and the battery side of breakers CB A and CB B, and between the negative battery discharge bar and the miscellaneous load panel. The monitoring is accomplished by connecting an external load recording unit to load monitoring jacks TP1 and TP2. Operation of the load monitor switch allows the circuit under test to be monitored by selecting the circuit shunts R1, R2, R3, LM1, and LM2.

Section 3: Operation

Preparation

Before putting the plant into service, check that:

- The rectifiers are ready for operation in accordance with the vendor's documentation for the operation of the rectifiers.
- The charger ON-OFF power switches are in the OFF position.
- All connections to the power plant and rectifiers have been correctly made.
- Correct fuses are in place and spare fuses are available.

Starting

Operate the ON-OFF switch on each rectifier to the ON position. Check that the power plant voltmeters indicate the nominal voltage for the type and number of cells in the office battery. If necessary, adjust the float voltage setting of each rectifier to be in agreement with Table 4-B.

Rectifier removal

To remove a rectifier from service, operate the ON-OFF switch to the OFF position. If the rectifier is to remain out-of-service:

- Remove the ac service from the rectifier.
- Remove the charge alarm fuse, if any.
- Remove the charge fuse or switch off the rectifier's output breaker (whichever applies).
- Remove the RC regulating fuse from the power plant control panel.

Rectifier restoral

To restore a rectifier to service:

- Replace the RC regulating fuse in the power plant control panel.
- Replace the charge fuse, if any.
- Replace the charge alarm fuse or switch on the rectifier’s output breaker (whichever applies).
- Restore ac service to the rectifier.
- Operate the ON-OFF switch to the ON position, if applicable.

Section 4: Adjustments and Testing

CAUTION 1: Before replacing the control fuse, or testing any fuse, operate the ENB/DIS switch to the DIS position (see Figure 4-1).

CAUTION 2: Voltage inside active charger units may exceed 150 V to ground and between terminals. Battery voltage exists within the charger units even after the charger units have been turned off.

Battery cells

Maintain battery cells in accordance with vendor's documentation.

Tools and test equipment

If the power bay controller requires calibration, the following tools and test sets are required:

- small flat-blade screwdriver
- variable DC Power Supply (42-58 V, 0-2 A; Anatek, HP, or equivalent) and
- output connection leads
- digital voltmeter (Fluke 8000 or equivalent)
- flashlight
- dummy load (size as required; the office load may be used)

Rectifier voltage and current limit

For detailed adjustment information, refer to the specific rectifier's vendor documentation. Refer to Table 4-B for the float voltage setting of the rectifiers for the provisioned battery type. Generally, the rectifier voltage setting and current limit adjustments are as follows:

- Place FLS switch in OFF position.
- Assuming the current limit adjustment is at full load for all rectifiers, a rectifier at partial load determines the plant float voltage. It may be assumed that any rectifier at full load has a voltage adjustment higher than plant voltage and that a rectifier at no-load is adjusted for lower than the plant voltage. Current limit may be checked by attempting to raise the rectifier voltage using the float potentiometer and the fine voltage potentiometer located on the front panel of the rectifier, or the voltage adjust potentiometer located on the rectifier. After checking is completed, readjust the rectifier to its original setting.
- The voltage adjustment for the no-load rectifiers may be determined by turning off the rectifier which is at partial load. By this action, the load is transferred to one of the no-load rectifiers. As one of the no-load rectifiers assumes the load formerly carried by the shut-off rectifier, the plant voltage represents the setting of the rectifier now at partial load. By continuing to shut down partially loaded rectifiers, the adjustment of each no-load rectifier may be determined. If these tests are made when office load is at its minimum value, all rectifiers which control plant float may be checked by ON-OFF switch operation.
- The voltage setting of a rectifier at full load may be determined only by lowering its voltage adjustment until it is at partial load, at which time the plant voltage represents its setting.
- When the minimum office load requires some rectifiers to operate continuously at full load, these rectifiers do not contribute to the day-to-day float value, but should be checked occasionally because an excessively high setting could cause a plant high voltage in the rare case of an operated discharge fuse or other loss of normal constant load.

Forced load share

Place switch FLS in OFF position. Adjust the float voltage to within 0.1 V for all rectifiers of this series connected in parallel. Switch ac circuit breakers to the OFF position on all rectifiers except for the first one. Turn the FLS potentiometer clockwise on the first rectifier to its mid-point position. Switch ac circuit breaker on the second rectifier to the ON position. Allow approximately 5 minutes for the rectifier to stabilize. Readjust the float potentiometer on the second rectifier to share the load proportionally with the first rectifier, if required. Switch the FLS switch to the ON position for both rectifiers, and adjust the FLS potentiometer on the second rectifier until it shares the load to within +5 percent of the rated load of the rectifier.

When more than two rectifiers are connected in parallel, repeat this procedure for each subsequent rectifier as explained for the second rectifier.

Rectifier failure alarm

The rectifier failure alarms can be tested by the steps listed in Table 4-A.

Table 4-A:
Testing failure alarms

Steps	Results
Operate ON-OFF switch on one rectifier to OFF position	DC Min LED lights
Operate ON-OFF switch on second rectifier to OFF position	DC Maj LED lights
Restore switches on both rectifiers to ON position	Related alarms clear
Remove ac fuse for one rectifier	AC Min LED lights (see note)
Remove ac fuse for second rectifier	AC Maj LED lights (see note)
Replace fuse for both rectifiers	Related alarms clear

Note: *DC Min or DC Maj (whichever applies) will result if the rectifier itself has no provision for detecting an ac input failure.*

Fuse alarm

Check all fuse alarms as follows:

Note: *The ENB/DIS switch must be in the DIS position.*

- QFF1-type fuses: Push in indicator on front of fuse.
- NE-70-type fuses: Using a test receiver, connect test battery to the rim of the fuse cap.

The FA LED lights and a major alarm is raised.

Adjustments and testing

Controller adjustment procedure for NT3T62AA (or P0567578)

This procedure applies to the J2419AA Power Control Shelf equipped with either the NT3T62AA or P0567578 power monitor and control pack. The P0567578 unit has a black faceplate with 4 potentiometer ports, 11 indicator lamps, and 2 metering jacks. Open the front panel of the J2419AA and determine which of the two packs is provisioned before continuing with this procedure.

Refer to Figure 4-1 for the location of the switches, LEDs, and fuses mentioned in the procedure below.

Preparation

1) Operate the ENB/DIS switch in the DIS (down) position. This will cancel alarms extended to the Alarm Monitoring Facility switch and will light the DIS indicator LED. Operate the equalize timer switches, labeled EQL and SW to the OPEN position.

2) At the rear of the J2419AA shelf, disconnect the wire that connects to terminal 14 of terminal block J1-2. This wire connects to the trip coils located inside of the main A and B circuit breakers which supply power to the switching equipment. Insulate the bare end of the wire and do not let it come into contact with any office battery potential. FAILURE TO COMPLETE THIS STEP WILL RESULT IN A COMPLETE POWER OUTAGE TO THE CENTRAL OFFICE SWITCHING SYSTEM LATER IN THIS PROCEDURE.

3) Remove the controller fuse (labeled CONT).

4) Turn the LV and HF potentiometers fully counter-clockwise; turn the HV and LF potentiometers fully clockwise.

5) With the variable auxiliary DC power supply unit turned off, connect its negative output terminal to block J2, terminal 3 located at the rear of the J2419AA control shelf; connect the positive terminal of the power supply to block J1-1, terminal 1, also located at the rear of the J2419AA control shelf. Do not remove other wires that are connected to these terminals.

6) Set the output voltage of the variable auxiliary DC power supply unit to minimum and turn its power switch on.

7) Set the Digital Voltmeter (DVM) to DC volts and set the voltage range to 0-200V (or another appropriate range for monitoring -40.0 to -60.0 volts). Connect the"+"DVM lead to the red meter jack labeled"-48V"and connect the"-"DVM lead to the black meter jack labeled"GRD."

Low voltage (LV) alarm setting adjustment and testing

1) Adjust the variable auxiliary power supply so that the DVM reads -43.5 volts.

2) Gradually turn the LV potentiometer clockwise until the LV indicator LED turns on.

3) Increase the auxiliary power supply voltage and note that the LV indicator LED turns off when the DVM reads between -44.0 and -47.5 volts. Slowly decrease the auxiliary power supply voltage and note that the LV indicator LED turns on when the DVM reads between -43.25 and -43.75 volts.

Low float (LF) alarm setting adjustment and testing

1) Adjust the variable auxiliary power supply so that the DVM reads at the middle of the voltage range specified in the Low Float column of Table 4-B for the provisioned battery type (for example, a 24-cell lead-calcium battery with a specific gravity of 1.210 would have an LF setting of -51.15 to -51.65 volts; the middle of this voltage range would be -51.40 volts).

2) Gradually turn the LF potentiometer counter-clockwise until the LF indicator LED turns on.

3) Increase the auxiliary power supply voltage by 0.3 volts and note that the LF indicator LED turns off. Slowly decrease the auxiliary power supply voltage and note that the LF indicator LED turns on within +/-.25 volts of the LF setting determined in step 1 above.

High float (HF) alarm setting adjustment and testing

1) Adjust the variable auxiliary power supply so that the DVM reads at the middle of the voltage range specified in the High Float column of Table 4-B for the provisioned battery type (for example, a 24-cell lead-calcium battery with a specific gravity of 1.210 would have an HF setting of -54.00 to -54.25 volts; the middle of this voltage range would be -54.13 volts).

2) Gradually turn the HF potentiometer clockwise until the HF indicator LED turns on.

3) Decrease the auxiliary power supply by 0.3 volts and note that the HF indicator LED turns off. Slowly increase the auxiliary power supply voltage and note that the HF indicator LED turns on within +/-.25 volts of the HF setting determined in step 1 above.

High voltage (HV) alarm setting adjustment and testing

1) Adjust the variable auxiliary power supply so that the DVM reads at the middle of the voltage range specified in the High Voltage column of Table 4-B for the provisioned battery type (note that in all cases, except when maintenance-free cells are used, this voltage will be -56.13 volts).

2) Gradually turn the HV potentiometer counter-clockwise until the HV indicator LED turns on.

3) Decrease the auxiliary power supply to the middle of the range of the HF voltage setting specified in Table 4-B (see step 1 of the High Float Alarm Setting Adjustment and Testing section above to determine the HF mid-range voltage) and note that the HV indicator LED turns off.

4) Increase the auxiliary power supply voltage and note that the HV indicator LED turns on within +/-.25 volts of the HV setting determined in step 1 above.

Return to normal operation

1) Remove the DVM test leads from the meter jacks.
2) Turn off the auxiliary power supply and remove its leads from block J2, terminal 3, and from block J1-1, terminal 1. Make certain that other wires connected to these terminals are re-secured after the auxiliary power supply output leads are removed.
3) Replace the CONT fuse in its original position. Determine whether the DIS indicator lamp is on. If this lamp is not on and the ENB/DIS switch is in the DIS position, recheck the terminal block J2, terminal 3, and J1-1, terminal 1 connections before proceeding.
4) At this point in the procedure, no LED indicator lamps other than the DIS indicator should be on. If either the LF or HF indicators are on and the battery voltage is confirmed to be outside of the determined range, then the float settings of the rectifiers must be adjusted to be in agreement with the determined float range. Refer to specific rectifier vendor documentation or refer to the Rectifier Voltage and Current Limit section of this NTP to correct this condition following completion of this procedure. DO NOT PROCEED TO STEP 5 IF THE LV LED INDICATOR IS ON; DETERMINE AND CLEAR THE CAUSE FIRST.
5) Reconnect the wire that was removed and insulated in step 2 of the Preparation section above to J1-2, terminal 14.
6) Operate the equalize switches (EQL, SW) to OPEN or to their original positions. Operate the ENB/DIS switch to the ENB (up) position.

Controller adjustment procedure for NT3T62AB

The NT3T62AB has four front panel adjustment ports for setting potentiometers which control the battery voltage alarm thresholds. From left to right, the adjustment ports are: Low Float (LF), High Float (HF), Secondary Low Voltage and Primary Low Voltage (LV; a double-wide port with the secondary adjustment on the left half of the port and the primary adjustment on the right half of the port), and High Voltage (HV).

For the adjustment procedures which follow, refer to the Power Plant Controller Alarm Settings in Table 4-B. Select the controller voltage setting appropriate for the battery configuration which the NT3T62AB is intended to monitor. Unless specified otherwise at the time of manufacture, the NT3T62AB default settings will match those for a 24-cell lead-calcium battery with a specific gravity of 1.225.

Preparation

1) Set all EQL (equalize) switches to OPEN.

2) Confirm that the ENB/DIS switch is in the DIS (down) position and that the low-voltage trip wire connecting to J1-2 terminal 14 has been disconnected and insulated.

WARNING: **Failure to disconnect the connection to J1-2 terminal 14, or otherwise defeat the low-voltage disconnect feature when adjusting the NT3T62AB, can result in activation of the low-voltage load disconnect circuitry followed by a main power outage of the systems served by the power plant which the NT3T62AB monitors.**

3) Remove the controller fuse (labeled CONT).

4) Set the Digital Voltmeter (DVM) to DC volts and set the voltage range to 0 - 200V (or another appropriate range for monitoring -40.0 to -60.0 volts). Connect the '+' DVM lead to the variable auxiliary DC power supply's negative output and connect the '-' DVM lead to the supply's positive output.

5) With the J2419AA front panel closed, and with the variable auxiliary DC power supply unit turned off, connect the supply's negative output terminal to the metering terminal labeled '-48' on the NT3T62AB faceplate. Connect the positive output terminal of the supply to the metering terminal labeled 'GRD' on the NT3T62AB faceplate.

6) Set the output voltage of the variable auxiliary DC power supply unit to minimum and turn its power switch on. If the supply has a current limit control, set the limit control to greater than 350mA. The supply's output will be referred to as '-48 nominal' in the following procedures.

Low-float (LF) alarm setting adjustment and testing

1) Adjust -48 nominal so that the -48 nominal DVM reads at the middle of the voltage range specified in the Low Float column of Table 4-B for the provisioned battery type (for example, a 24-cell lead-calcium battery with a specific gravity of 1.225 would have an LF setting of -51.6 to -52.1 volts; the middle of this voltage range would be -51.85 volts).

2) If the LF LED is off, turn the LF potentiometer counter-clockwise as many turns as required to just beyond the set point where the LF LED turns on. If the LF LED is on, turn the LF potentiometer clockwise as many turns as required to the set point just before where the LF LED turns off.

3) Increase the -48 nominal power supply by 0.3 volts and note that the LF indicator LED turns off. Slowly decrease this power supply and note that the LF indicator LED turns on within +/- .25 volts of the LF setting determined in step 1 above.

High-float (HF) alarm setting adjustment and testing

1) Adjust -48 nominal so that the -48 nominal DVM reads at the middle of the voltage range specified in the High Float column of Table 4-B for the provisioned battery type (for example, a 24-cell lead-calcium battery with a specific gravity of 1.225 would have an HF setting of -54.20 to -54.70 volts; the middle of this voltage range would be -54.45 volts).

2) If the HF LED is off, turn the HF potentiometer clockwise as many turns as required to just beyond the set point where the HF LED turns on. If the HF LED is on, turn the HF potentiometer counter-clockwise as many turns as required to the set point just before where the HF LED turns off.

3) Decrease the -48 nominal power supply by 0.3 volts and note that the HF indicator LED turns off. Slowly increase this power supply and note that the HF indicator LED turns on within +/- .25 volts of the HF setting determined in step 1 above.

High-voltage (HV) alarm setting adjustment and testing

1) Adjust -48 nominal so that the -48 nominal DVM reads at the middle of the voltage range specified in the High Voltage column of Table 4-B for the provisioned battery type (for example, a 24-cell lead-calcium battery with a specific gravity of 1.225 would have an HV setting of -56.00 to -56.25 volts; the middle of this voltage range should be -56.12 volts).

2) If the HV LED is off, turn the HV potentiometer clockwise as many turns as required to just beyond the set point where the HV LED turns on. If the HV LED is on, turn the HV potentiometer counter-clockwise as many turns as required to the set point just before where the HV LED turns off.

3) Decrease the -48 nominal power supply by 0.3 volts and note that the HF indicator LED turns off. Slowly increase this power supply and note that the HV indicator LED turns on within -0.12 and +0.13 volts of the HF setting determined in step 1 above.

Primary low-voltage (LV) alarm setting adjustment and testing

1) Adjust -48 nominal so that the -48 nominal DVM reads at the middle of the voltage range specified in the Low Voltage column of Table 4-B for the provisioned battery type (for example, a 24-cell lead-calcium battery with a specific gravity of 1.225 would have an LV alarm point setting of -43.25 or-43.75 volts; the middle of this voltage range would be -43.5 volts).

2) Close DIP switch S1-7 in order to cancel any alarms which may be generated from the secondary low-voltage monitor.

3) Skip to step 4 if the LV LED is flashing (flash rate is approximately 3Hz). If the LV LED is not flashing, turn the right-hand LV potentiometer clockwise until the LV LED begins to flash.

4) Turn the right-hand LV potentiometer counter-clockwise until just beyond the set point where the LV LED ceases to flash; then gradually turn the potentiometer clockwise until the LV LED just begins to flash.

5) Momentarily increase the -48 nominal power supply to approximately -48V DC and then gradually decrease the supply voltage to the LV set point determined in step 1 above. Confirm that the LV LED begins to flash within +/- .25 volts of the intended LV set point. Return the power supply to the LV alarm point setting determined in step 1 and repeat steps 3, 4, and 5 as required to refine the potentiometer setting.

6) Increase the -48 nominal input power supply voltage and note that the LV indicator LED ceases to flash when the DVM reads between -44.0 and -47.5 volts. Open DIP switch S1-7 when the Primary Low-Voltage Alarm adjustment steps above are complete.

Secondary low-voltage (LV) alarm setting adjustment and testing

1) Adjust -48 nominal so that the -48 nominal DVM reads at the middle of the voltage range specified in the Low Voltage column of Table 4-B for the provisioned battery type (for example, a 24-cell lead-calcium battery with a specific gravity of 1.225 would have an LV alarm point setting of -43.25 to -43.75 volts; the middle of this voltage range would be -43.5 volts).

2) Close DIP switch S1-4 in order to cancel any alarms which may be generated from the primary low-voltage monitor.

3) Skip to step 4 if the LV LED is flashing (flash rate is approximately 3Hz). If the LV LED is not flashing, turn the left-hand LV potentiometer clockwise until the LV LED begins to flash.

4) Turn the left-hand LV potentiometer counter-clockwise until just beyond the set point where the LV LED ceases to flash; then gradually turn the potentiometer clockwise until the LV LED just begins to flash.

5) Momentarily increase the -48 nominal power supply to approximately -48V DC and then gradually decrease the supply voltage to the LV set point determined in step 1 above. Confirm that the LV LED begins to flash within +/- .25 volts of the intended LV set point. Return the power supply to the LV alarm point setting determined in step 1 and repeat steps 3, 4, and 5 as required to refine the potentiometer setting.

6) Increase the -SENSE input power supply voltage and note that the LV indicator LED ceases to flash when the -SENSE DVM reads between -44.0 and -47.5 volts. Open DIP switch S1-4 when the Secondary Low-Voltage Alarm adjustment steps above are complete.

Return to normal operation

1) Confirm that the ENB/DIS switch on the J2419AA front panel is in the DIS (down) position. Turn off the -48 nominal auxiliary power supply and remove its output leads from the NT3T62AB faceplate jacks.

2) Re-install the CONT fuse in its original position. Confirm that the NT3T62AB DIS indicator LED is on.

3) At this point in the procedure, no LED indicator lamps other than the DIS indicator should be on. If either the LF or HF indicators are on and the battery voltage is confirmed to be outside of the determined range, then the float settings of the rectifiers must be adjusted to be in agreement with the determined float range. Refer to specific rectifier vendor documentation or refer to the paragraphs under the heading, Rectifier Voltage and Current Limit, at the beginning of this section to correct this condition following completion of this procedure. DO NOT PROCEED TO STEP 4 IF THE LV LED INDICATOR IS ON OR BLINKING; DETERMINE AND CLEAR THE CAUSE FIRST.

4) Reconnect the wire that was removed and insulated in step 2 of the preparation procedure above to J1-2, terminal 14.

5) Operate the equalize switches (EQL, SW) to OPEN or to their original positions. Operate the ENB/DIS switch to the ENB (up) position.

Equalize

The NT3T62AA and NT3T62AB have an on-board timer circuit which can be used to control the length of the equalize charging cycle imposed on the power plant battery. Whenever the equalize timer is active, the EQL LED indicator will be on, the output signal EQL (J1-2, 21) switches from open to the potential of -SENSE, and, on the NT3T62AB only, the output signal REM EQL (J1-1, 2) switches from open to GND potential. The HF alarm loop closure HF1-HF2 (J1-2, 17, to J1-2, 18, respectively) is canceled (that is, open) for the duration of the equalize cycle although the HF indicator LED may be on depending upon the HF alarm voltage threshold setting.

The equalize timer can be activated in one of two ways: 1) manually, by momentarily closing EQL SW switch 1 (S1-1) and then returning it to open; 2) automatically, by allowing the battery voltage to fall below the low-float setting. In either case, the output will be as described in the preceding paragraph and the length of the equalize timer cycle will be determined by the following EQL (S1) switch positions:

- SW 6 and 2 operated, 1 hour, 22 minutes (+/- approximately 8 minutes)

- SW 6 and 3 operated, 2 hours, 44 minutes (+/- approximately 16 minutes)

- SW 6 and 5 operated, 5 hours, 28 minutes (+/- approximately 33 minutes)

Final manufacturing default settings are SW 6 and 3 operated only. In order to speed testing time of the equalize timer states, SW 6 can be left open (during testing only) to generate the following cycles:

- SW 1 and 2 operated generates an equalize cycle alternating between approximately 10.5 seconds on, and 10.5 seconds off.

- SW 1 and 3 operated generates an equalize cycle alternating between approximately 21 seconds on, and 21 seconds off.

- SW 1 and 5 operated generates an equalize cycle alternating between approximately 42 seconds on, and 42 seconds off.

Table 4-B:
Power plant controller and rectifier settings

Battery Composition	Specific Gravity of Cells	Number of Cells	Power Plant Controller Alarm Settings				Rectifier Float Settings
			Low Voltage	Low Float	High Float	High Voltage	
Lead Antimony	1.210 to 1.215	24	43.50 to 44.00	49.25 to 49.50	52.50 to 52.75	56.00 to 56.25	51.60 to 52.08
Lead Calcium	1.170	24	43.50 to 44.00	50.40 to 50.90	53.28 to 53.78	56.00 to 56.25	52.43 to 52.93
	1.210	24	43.50 to 44.00	51.15 to 51.65	54.00 to 54.25	56.00 to 56.25	53.15 to 53.65
	1.225	24	43.50 to 44.00	51.60 to 52.10	54.20 to 54.70	56.00 to 56.25	53.39 to 53.89
	1.225	23	43.50 to 44.00	49.45 to 49.95	52.21 to 52.71	56.00 to 56.25	51.85 to 52.35
	1.250	23	43.50 to 44.00	50.14 to 50.64	52.90 to 53.40	56.00 to 56.25	52.08 to 52.58
	1.275	23	43.50 to 44.00	50.60 to 51.10	53.82 to 54.32	56.00 to 56.25	52.99 to 53.49
	1.300	22	43.50 to 44.00	49.06 to 49.56	52.36 to 52.86	56.00 to 56.25	51.56 to 52.06
Maintenance-free Sealed Lead Calcium	1.300	24	43.50 to 44.00	52.56 to 52.80	54.24 to 54.48	56.25 to 56.75	53.88 to 54.12
	1.300	23	43.50 to 44.00	50.37 to 50.60	53.13 to 53.63	54.28 to 54.78	51.75 to 52.90

Section 5: Fault Locating

Table 5-A: Power Plant Fault-locating

Symptoms	**Possible cause(s)**
No output current.	Discharge fuses open A and B circuit breakers are off Faulty connection between battery and load fuse
Incorrect indication of output current.	Faulty meter Incorrect/faulty meter shunt or shunt leads
Low discharge voltage.	Discharge load greater than rectifier capacity
Low float voltage	Faulty rectifier Improperly-adjusted rectifier Short-circuit battery cell Prolonged AC power failure
High discharge voltage.	Faulty rectifier Improperly-adjusted rectifier
High float voltage.	Faulty rectifier Improperly-adjusted rectifier
Failure to give HV or LV alarms during high-voltage or low-voltage conditions.	Faulty HV or LV LED Faulty 3T62 circuit board
Failure to give rectifier failure alarms.	Faulty rectifier circuitry Incorrect wiring between rectifier and J2419AA Faulty AC Min, AC Maj, DC Min, or DC Maj alarms Faulty 3T62 circuit board

**Table 5-A:
Power Plant Fault-locating**

Symptoms	Possible cause(s)
Failure to give fuse alarms.	Faulty fuseholder Incorrect wiring between fuseholder and J2419 Faulty FA LED
AC Min LED lit.	No ac input to one rectifier*
AC Maj LED lit.	No ac input to more than one rectifier*
DC Min LED lit.	No dc output from one rectifier
DC Maj LED lit.	No dc output from more than one rectifier
ALM DIS LED lit.	ENB/DIS switch in disable position

Note: **DC Min or DC Maj alarm (whichever applies) will result if the rectifier itself has no provision for detecting an AC input failure.*

DMS-10 Family

600-Series Generics

J2419 Power Plant Description, Operation, and Maintenance

NTP number: NTP 297-3601-850
Release: 28.01
For Generic 602.20
Status: Standard
Date: August 2006