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Special Instruction
Installation Procedure for Excitation Modules 10 and 15{4467}
Media Number -REHS9792-00 **Publication Date -28/07/2015** **Date Updated -28/07/2015**

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Installation Procedure for Excitation Modules 10 and 15{4467}

SMCS - 4467

Electric Power Generation:
3512 GEN SET (S/N: ZAF1-UP)

Introduction

This Special Instruction provides information for the installation of the Excitation Module 10 (**448-1092** Generator Set Control Gp), or the Excitation Module 15 (**448-1092** Generator Set Control Gp) required to upgrade the 3512 Generator Set.

Refer to Specification Sheet, LEHE0448, "IVR Specification Sheet", Specification Sheet, LEHE0449, "EM10 Specification Sheet", and Specification Sheet, LEHE0450, "EM15 Specification Sheet", for applicable installation references.

Refer to Application & Installation Guide, LEBE0006, "EMCP 4.1, 4.2 Application & Installation Guide", and Application & Installation Guide, LEBE0007, "EMCP 4.3, 4.4 Application & Installation Guide" for necessary application and installation guidance.

Important Safety Information

Do not perform any procedure in this Special Instruction until you have read this Special Instruction and you understand this information. Use only proper tools and observe all precautions that pertain to the use of those tools. Failure to follow these procedures can result in personal injury. The following procedures should also be observed.

Work safely. Most accidents that involve product operation, maintenance, and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs.

A person must be alert to potential hazards. This person should also have the necessary training, skills, and tools in order to perform these functions properly.

Safety precautions and warnings are provided in this instruction and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons. Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard.

Therefore, the warnings in this publication and the warnings that are on the product are not all inclusive. Ensure that any tool, procedure, work method, or operating technique you use that is not recommended by Caterpillar is safe.

Ensure that the product will not be damaged or the product will not be made unsafe by the operation, lubrication, maintenance, or repair procedures used.

Ground the equipment. Improper grounding will result in electrical current paths that are uncontrolled and unreliable. Uncontrolled electrical circuit paths can result in damage to the equipment. Uncontrolled electrical circuit paths can also cause electrical activity that may degrade the electronics and communications. Ensure that all grounds are secure and free of corrosion.

Lock Out / Tag Out

Illustration 1 g02324673

WARNING

Risk of injury from electrical shock or death by electrocution is present while equipment is energized. Turn the battery disconnect switch to the OFF position and lockout the battery disconnect switch with a safety lock. Review the Safety Section of the Operation and Maintenance Manual to ensure the generator is isolated prior to completing this procedure.

Electrostatic Discharge Awareness

The Asset IQ Generator Control contains components that are sensitive to electrostatic discharges (ESD). ESDs can damage the control, resulting in Asset IQ Generator Control breakdown or improper operation.

Take the following precautions while installing, removing, or handling the control, to prevent damaging the Asset IQ Generator Control:

- Handle equipment correctly.
- Use ESD protective packaging and material handling containers that are anti-static and provide discharge protection and electric field suppression.
- Use protective devices, such as ESD-protective workstations and/or work surfaces, grounding mat, anti-static wrist strap, or equivalent.
- Keep all plastic items, such as candy wrappers, foam cups, synthetic carpet, or foam cushions away from the devices. Such items are all potential static generators.
- The anti-static bag cannot be used as a static dissipating mat.
- Do not use an anti-static bag for any other purpose than to enclose a product.

Required Parts

The following Caterpillar Part Kits will be required to complete the installation or retrofit of the Caterpillar Digital Voltage Regulator (CDVR), Digital Voltage Regulator (DVR), Voltage Regulator Version 6 (VR6), and Voltage Regulator Version 3 (VR3) found in the Caterpillar 3512 GEN SET.

Table 1

Required Parts for the Installation / Retrofit of the CDVR, DVR, VR6, and VR3 Excitation Modules		
Quantity	**Part Number**	**Description**
1	467-1361	Electrical Installation Gp EM10
1	473-5157	Electrical Installation Gp EM15

Table 2

Parts Listed in the 467-1361 Electrical Installation Gp EM10		
Quantity	**Part Number**	**Description**
3	2L-8076	Ring Terminals
3	2L-8079	Ring Terminals
3	3K-6060	Locknuts
1	3N-5977	Fuse Block
8	4B-4674	Washers
3	4L-6454	Bolts
3	7C-5708	Grommets
3	7C-5709	Sleeves
3	7W-0482	Fuses
6	7X-0586	Hard Washers
15	8C-8792	Electrical Wire
2	8T-0328	Hard Washers
3	8T-4121	Hard Washers
16	8T-4205	Hard Washers
4	8T-4971	Bolts
4	8T-5066	Bolts
4	8T-9364	Bolts
2	9S-5937	Locknuts
2	033-4814	Screws
8	129-3178	Locknuts
1	448-1092	Generator Set Control Gp (EXCITATION MODULE 10)
4	448-1934	Spacers
1	467-1362	Wiring Harness
1	467-1363	Wiring Harness
1	467-1364	Wiring Harness
1	467-1368	Plate

Note: Parts listed in Table 2 are to be used when upgrading the Generator set with Excitation Module 10.

Table 3

Parts Listed in the 473-5157 Electrical Installation Gp EM15		
Quantity	**Part Number**	**Description**
3	2L-8076	Ring Terminals
3	2L-8079	Ring Terminals
3	3K-6060	Locknuts
1	3N-5977	Fuse Block
8	4B-4674	Washers
3	4L-6454	Bolts
3	7C-5708	Grommets
3	7C-5709	Sleeves
3	7W-0482	Fuses
6	7X-0586	Hard Washers

15	8C-8792	Electrical Wire
2	8T-0328	Hard Washers
3	8T-4121	Hard Washers
16	8T-4205	Hard Washers
4	8T-4971	Bolts
4	8T-5066	Bolts
4	8T-9364	Bolts
2	9S-5937	Locknuts
2	033-4814	Screws
8	129-3178	Locknuts
1	448-1093	Electronic Control Gp (EXCITATION MODULE 15)
4	448-1934	Spacers
1	467-1362	Wiring Harness
1	467-1363	Wiring Harness
1	467-1364	Wiring Harness
1	467-1368	Plate

Note: Parts listed in Table 3 are to be used when upgrading the Generator set with Excitation Module 15.

Installation Procedure

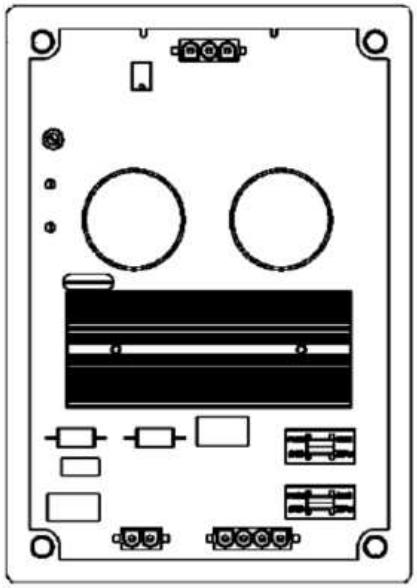

Illustration 2 g03851498

Excitation Module top view

The Excitation Modules are designed to provide excitation current to a generator controlled by the Integrated Voltage Regulator (IVR) feature in the EMCP 4.2, 4.3, and 4.4 controls. This Special Instruction provides guidance and instructions to facilitate the installation of the **448-1092** Generator Set Control Gp (EXCITATION MODULE 10) or the **448-1093** Electronic Control Gp (EXCITATION MODULE 15) .

Before the new **467-1361** Electrical Installation Gp or the **473-5157** Electrical Installation Gp can be installed, the existing voltage regulator must be removed. Additionally, any existing issues with the Generator Control, the Generator Set, or any wiring in between, must be resolved before installing a new Excitation Module.

Resolve Existing Issues

If the existing installation has Generator Set or Control issues, these issues must be addressed prior to performing a Control upgrade. Troubleshooting a failure will become more difficult after the new Control is installed. Performing the tasks in the procedures that follow may not be possible if the Control has failed. Use the documentation appropriate for the specific Control/Voltage Regulator being replaced. Insure that the Control and Generator Set are working without issues.

Voltage and Continuity Checks

Perform a voltage and continuity check to ensure that the schematic conforms to the as-built condition of the existing installation. An accurate schematic of the existing installation is required when installing the new Control.

1. Using a voltmeter, connect the negative lead to ground.
2. Measure the voltage at every point shown on the schematic that is connected to battery (+).
3. Check continuity for every point on the schematic that is connected to ground. Note on the schematic to reflect the Control as is currently installed.

Remove the Old Voltage Regulator

1. Disconnect the AC power from the battery charger.
2. Disconnect the battery charger from the battery.
3. Disconnect the negative battery lead from the Generator Set.
4. Insure that the generator has been disconnected and isolated from the power line and is locked and tagged out.
5. Remove the old Voltage regulators from the Voltage regulator mounting plate.

Installation of 448-1092 Generator Set Control Gp (EXCITATION MODULE 10) or 448-1093 Electronic Control Gp (EXCITATION MODULE 15) .

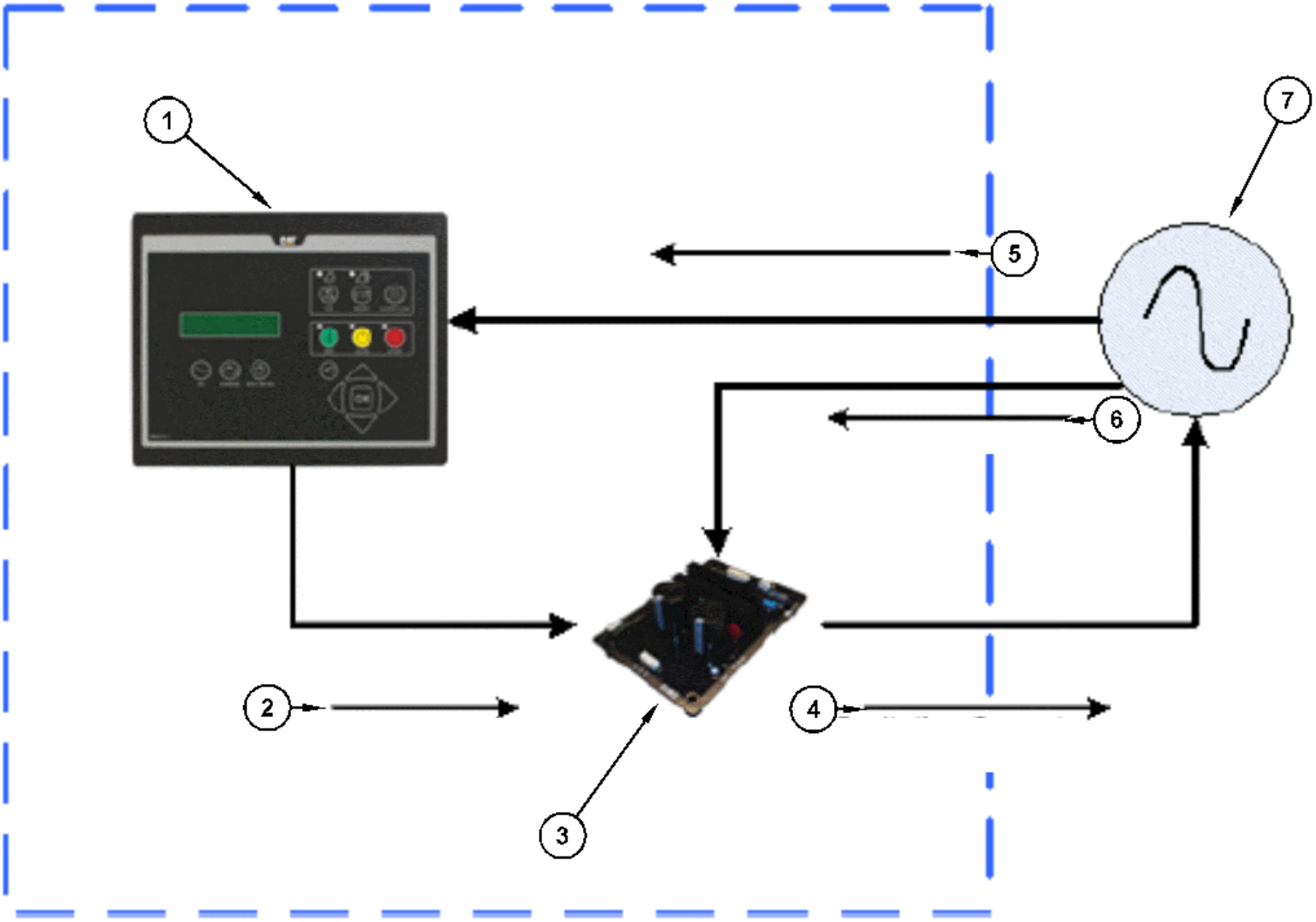

Illustration 3 g03851519

Excitation Module system overview

(1) IVR Logic Genset Control

(2) Excitation command

(3) Excitation module

(4) Excitation current

(5) Voltage and current sensing

(6) PMG Excitation

(7) Generator

Use the following procedures and illustrations to perform the installation / retrofit of the **448-1092** Generator Set Control Gp (EXCITATION MODULE 10) or **448-1093** Generator Set Control Gp (EXCITATION MODULE 15) .

Installation of the New Adapter Plate - Configuration #1

Remove existing VR6 Regulator (**368-1372** Voltage Regulator Kit) and replace with either **448-1092** Generator Set Control Gp (EXCITATION MODULE 10) or Excitation Module 15 (**448-1093** Generator Set Control Gp (EXCITATION MODULE 15)).

Table 4

Adapter Plate (467-1368 Plate) Mounting Hardware		
Quantity	**Part Number**	**Description**

4	8T-4971	Bolts
4	129-3178	Locknuts
8	8T-4205	Hard Washers

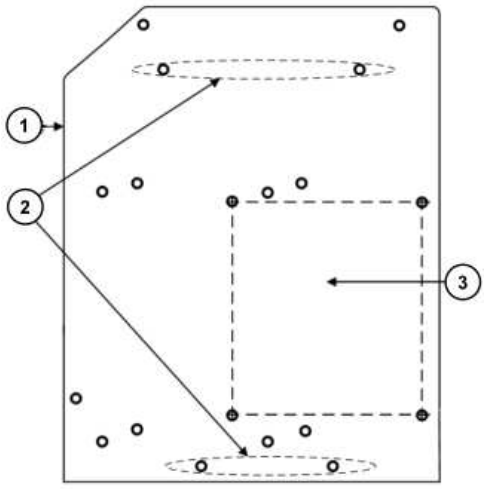

Illustration 4 g03848520

Adapter plate (467-1368 Plate) Configuration #1

(1) Adapter plate (467-1368 Plate)

(2) Mounting holes for Adapter plate (467-1368 Plate)

(3) Mounting holes and location for 448-1092 Generator Set Control Gp (EXCITATION MODULE 10), or 448-1093 Electronic Control Gp (EXCITATION MODULE 15)

Note: The new Adapter Plate shown in Illustration 4 replaces the old **115-9550** Bracket . The Excitation Module location (2) indicates where to mount the new Excitation Module, which replaces the old **368-1372** Voltage Regulator Kit .

Refer to Illustration 4 and use the hardware listed in the Table 4 to install the new Adapter Mounting Plate **467-1368** Plate .

Installation of the New Adapter Plate - Configuration #2

Remove existing VR3 Regulator (**7C-1600** Voltage Regulator As) and replace with either **448-1092** Generator Set Control Gp (EXCITATION MODULE 10) or **448-1093** Generator Set Control Gp (EXCITATION MODULE 15) .

Note: The existing Mounting Bracket will not be removed for the retrofit procedure. Once the existing VR3 Regulator has been removed, mount the new Adapter Plate (**467-1368** Plate) in its place.

Table 5

Adapter Plate (467-1368 Plate) Mounting Hardware		
Quantity	**Part Number**	**Description**
3	8T-4971	Bolts
3	129-3178	Locknuts
3	7C-5708	Grommets
3	7C-5709	Sleeves
6	7X-0586	Hard Washers
3	8T-4205	Hard Washers

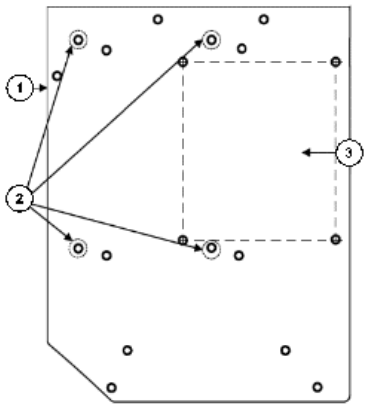

Illustration 5 g03858389

Adapter plate (467-1368 Plate) Configuration #2

(1) Adapter plate (467-1368 Plate)

(2) Mounting holes for Adapter plate (467-1368 Plate)

(3) Mounting holes and location for 448-1092 Generator Set Control Gp (EXCITATION MODULE 10), or 448-1093 Electronic Control Gp (EXCITATION MODULE 15)

Refer to Illustration 5 and use the hardware listed in the Table 5 to install the new Adapter Mounting Plate **467-1368** Plate .

Installation of the New Adapter Plate - Configuration #3

Remove existing VR3 Regulator (**9y-8400** Voltage Regulator Gp , **114-5510** Voltage Regulator As , **155-3832** Voltage Regulator As , or **155-3835** Voltage Regulator As , and replace with either **448-1092** Generator Set Control Gp (EXCITATION MODULE 10) or **448-1093** Generator Set Control Gp (EXCITATION MODULE 15) .

Note: The existing Mounting Bracket will not be removed for the retrofit procedure. Once the existing VR3 Regulator has been removed, mount the new Adapter Plate (**467-1368** Plate) in its place.

Refer to Table 5 for mounting hardware.

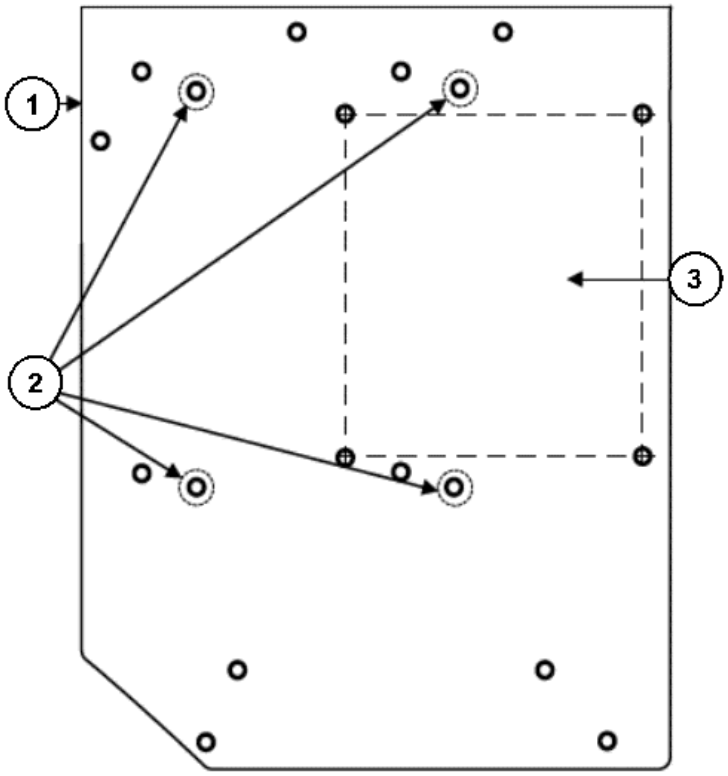

Illustration 6 g03858397

Adapter plate (467-1368 Plate) Configuration #3

(1) Adapter plate (467-1368 Plate)

(2) Mounting holes for Adapter plate (467-1368 Plate)

(3) Mounting holes and location for 448-1092 Generator Set Control Gp (EXCITATION MODULE 10), or 448-1093 Electronic Control Gp (EXCITATION MODULE 15)

Refer to Illustration 6 and use the hardware listed in the Table 5 to install the new Adapter Mounting Plate **467-1368** Plate .

Installation of the New Adapter Plate - Configuration #4

Remove existing CDVR (**314-7755** Voltage Regulator As , or **242-3487** Voltage Regulator Mounting Gp), along with the Mounting Bracket (**115-9550** Bracket), and replace with either **448-1092** Generator Set Control Gp (EXCITATION MODULE 10) or **448-1093** Generator Set Control Gp (EXCITATION MODULE 15).

Table 6

Adapter Plate (467-1368 Plate) Mounting Hardware		
Quantity	**Part Number**	**Description**
3	8t-9364	Bolts
3	8T-4205	Hard Washers

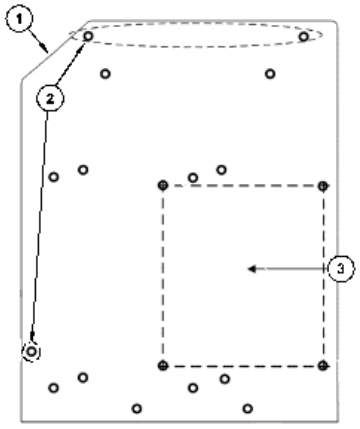

Illustration 7 g03858406

Adapter plate (467-1368 Plate) Configuration #4

(1) Adapter plate (467-1368 Plate)

(2) Mounting holes for Adapter plate (467-1368 Plate)

(3) Mounting holes and location for 448-1092 Generator Set Control Gp (EXCITATION MODULE 10), or 448-1093 Electronic Control Gp (EXCITATION MODULE 15)

Refer to Illustration 7 and use the hardware listed in the Table 6 to install the new Adapter Mounting Plate **467-1368** Plate .

3N-5977 Fuse Block Installation

Install the **3N-5977** Fuse Block close to the output tabs of the PM Generator using the hardware listed in Table 7.

Table 7

Parts List for the 3N-5977 Fuse Block Installation		
Quantity	**Part Number**	**Description**
1	3N-5977	Fuse Block
2	033-4814	Screws
2	8T-0328	Hard Washers
2	9S-5937	Locknuts
3	422-6095	Fuses

3N-5977 Fuse Block Wiring Installation

After installing the **3N-5977** Fuse Block , install the wiring between the Fuse Block and the output tabs of the PM Generator. Use the hardware listed in Table 8 below.

Table 8

3N-5977 Fuse Block Wiring Installation Hardware		
Quantity	**Part Number**	**Description**
AR	5P-0702	Heat Shrink Tube
AR	8C-8792	Electrical Wire
3	2L-8076	Ring Terminals
3	2L-8079	Ring Terminals
3	4L-6454	Bolts
3	8T-4121	Hard Washers
3	3K-6060	Locknuts

Excitation Module Installation

Refer to Illustration 4, callout (2), for the location of the Excitation Module installation on Adapter plate **467-1368** Plate .

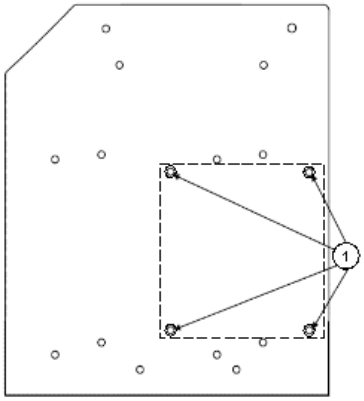

Illustration 8 g03853192

Table 9

Excitation Modules #10 and #15 Mounting Hardware		
Quantity	**Part Number**	**Description**
1	448-1092	Generator Set Control Gp
1	448-1093	Electronic Control Gp
4	8T-5066	Bolts
4	448-1934	Spacers
8	4B-4674	Washers
8	8T-4205	Hard Washers
4	129-3178	Locknuts

Refer to Illustration 8 and use the hardware listed in Table 9 to install either **448-1092** Generator Set Control Gp (EXCITATION MODULE 10), or **448-1093** Electronic Control Gp (EXCITATION MODULE 15), as required.

Harnesses Installation

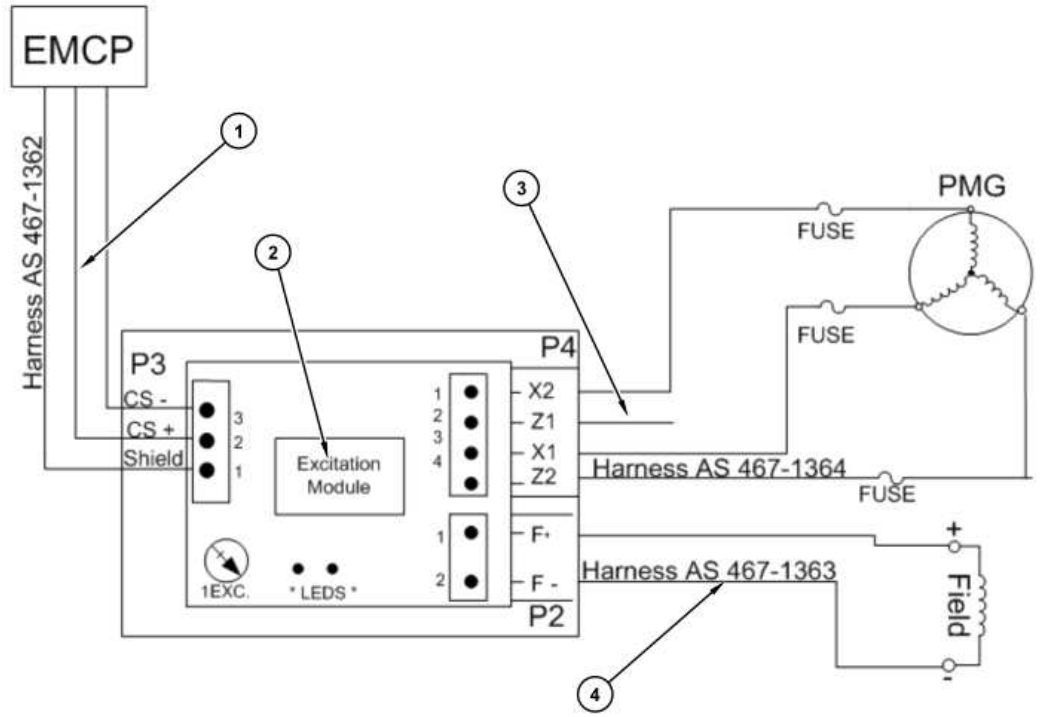

Illustration 9 g03852663

Excitation modules system connections diagram

(1) 467-1362 Wiring Harness

(2) Excitation Module 10, or Excitation Module 15

(3) 467-1363 Wiring Harness

(4) 467-1364 Wiring Harness

Note: Refer to Special Instruction, REHS9106, "INTEGRATED VOLTAGE REGULATOR"

Table 10

Wire Harness and Fuse Block Wiring Installation Hardware		
Quantity	**Part Number**	**Description**
1	467-1362	Wiring Harness
1	467-1363	Wiring Harness
1	467-1364	Wiring Harness
3	3N-5977	Fuse Blocks
AR	8C-8792	Electrical Wire
3	2L-8076	Ring Terminals
3	2L-8079	Ring Terminals
3	4L-6454	Bolts
3	8T-4121	Hard Washers
3	3K-6060	Locknuts

Refer to Illustration 9 and Table 10 for the installation of the **3N-5977** Fuse Blocks and the required wiring harnesses.

Electrical Validation of the EM10 and EM15

Refer to Special Instruction, REHS9106, "Integrated Voltage Regulator" for the proper Electrical Validation of the EM10 and EM15 Modules.

Control Parameter Configuration

For more information about EMCP 4.x set points, refer to Application & Installation Guide, LEBE0006, "EMCP 4.1, 4.2 Application & Installation Guide", and Application & Installation Guide, LEBE0007, "EMCP 4.3, 4.4 Application & Installation Guide" for necessary EMCP 4.x set points guidance. The set points can be configured using the Caterpillar Electronic Technician (Cat ET) Service Tool.

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