



# Transistor and Thyristor (SCR) Replacement for 1336 PLUS, PLUS II, FORCE, IMPACT and REGEN Drives.

## Description

These instructions cover the proper method of replacing transistor and SCR modules in the 1336 family of drives. Failure to properly prepare the mounting surface or to torque the components to rated specifications will result in decreased service life of the replacement components.

## Contents

<u>Description</u>	<u>Page</u>
Safety Precautions .....	1
Surface Preparation .....	2
Installation.....	2
Thermal Grease Requirements .....	3
Torque Mounting Sequence.....	4
Torque Specifications .....	5

## Safety Precautions



**ATTENTION:** Some printed circuit boards and drive components may contain hazardous voltage levels. Remove and lock out power before you disconnect or reconnect wires, and before you remove or replace fuses and circuit boards. Verify bus voltage by measuring the voltage between +DC and - DC on Terminal Block TB1. Do Not attempt to service the drive until the bus voltage has discharged to zero volts.

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**ATTENTION:** Potentially fatal voltages may result from improper useage of oscilloscope and other test equipment. The oscillscope chassis may be at a potentially fatal voltage if not properly grounded. If an oscilloscope is used to measure high voltage waveforms, use only a dual channel oscilloscope in the differential mode with X100 probes. It is recommended that the oscilloscope be used in the A minus B Quasi-differential mode with the oscilloscope chassis correctly grounded to an earth ground.

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**ATTENTION:** This assembly contains parts and sub-assemblies that are sensitive to electrostatic discharge. Static control precautions are required when servicing this assembly. Component damage may result if you ignore electrostatic discharge control procedures. If you are not familiar with static control procedures, reference Allen-Bradley Publication 8000-4.5.2 Guarding Against Electrostatic Damage, or any other applicable ESD protection handbook.

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## Surface Preparation

After removing the transistor or SCR modules from the drive, the heat-sink and replacement modules must be prepared using the following method to ensure proper heat transfer and operation of the replacement components.

1. Remove all old heat transfer compound from the surface of the heatsink using a tool such as a rubber spatula that will not mar the heatsink surface. Remove any remaining residue with a soft cotton cloth and a cleaning fluid such as Essex Cleaning Fluid, Brownell OS-3 by Dow Corning Co. (Mineral spirits may also be used if Essex cleaning fluid is not available).
2. Use a non-marring cleaning pad such as a Scotchbrite by 3M™ to remove any oxidation from the face of the heatsink. DO NOT use steel wool or sandpaper to clean the surface of the transistor/SCR baseplate or the heatsink, as they could scratch or score the surface which will impede heat transfer from the transistor to the heatsink.
3. Follow the oxidation removal with a final cleaning of both the heatsink and the module baseplate with cleaning fluid and the soft cloth.

NOTE: Thermal compound must be applied immediately to both surfaces as detailed in the following Installation section to prevent oxidation from reoccurring.

If a cleaning agent other than Essex by Dow Corning is used, make certain it leaves No residue on the heat transfer surfaces.

## Installation

Install the transistor or SCR module to the heatsink as follows:

1. Apply a liberal coating of thermal compound (AOS52022) to the transistor or SCR module base plate using the 6 gram blister pack (part number 196261) recommended in Table 1 for your particular device.
2. Apply the thermal compound until the metal surface is no longer visible. Do not allow any foreign particles or contamination to collect on the thermal grease. The nominal thickness of the grease coating should be about 0.005 inches or 0.127 millimeters.
3. Mount the transistor or SCR module on the heatsink, pressing and rotating in a slight circular motion to better seat the transistor onto the heatsink and distribute the grease more evenly.

4. Apply slight pressure and attempt to lift the module back off the heatsink. If the module does not easily separate from the heatsink, the thermal interface is correct. If the module easily separates from the heatsink with no suction effect, this could be due to insufficient grease or foreign particles on either the module base plate or the heatsink. Remove foreign particles and/or apply more grease and reseal the module until it is properly attached to the heatsink.

**Table 1.1 Thermal Grease Requirements**

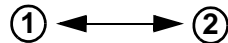
Spare Part Kit Number	Module Part Number	Vendor Part No.	Number of 6 gram blister packs per kit
135773	120632	TD61N12KOF	1
140142	120782	DD85N12K	1
142493	120782	DD85N12K	1
142505	120632	DT61N12KOF	1
142694	142126	DD89N14K	1
142744	141958	DT61N14KOF-L2	1
74100-818-01	22501-008-01	2MBI50N-120	2
74100-818-02	22501-008-02	2MBI50N-140	2
74100-819-05	194528-Q02	TD142N16KOF	2
74100-819-06	194528-Q02	TD142N16KOF	2
74100-820-05	22501-018-01	TTB6C110N12KOF	2
74100-820-06	22501-018-02	TTB6C110N14KOF	2
74103-167-01	22501-035-01	TD61N12KOF	1
74103-167-02	22501-035-02	TD61N14KOF	1
193434	191404-Q02	TTB6C165N16LOF	2
193982	22501-008-01	2MBI50N-120	2
193983	191451-Q01	2MBI100NC-120	3
194911	191404-Q01	TTB6C135N16LOF	3
74001-409-10	22501-026-02	2MBI150J-120	3
74001-409-16	22501-043-01	2MBI150NC-120	3
74100-818-03	22501-039-01	2MBI75N-120	2
74100-818-24	22501-009-02	2MBI75J-140	2
74100-818-05	22501-010-01	2MBI100NB-120	3
74100-818-06	22501-010-02	2MBI150NB-120	3
74100-818-07	22501-010-04	2MBI100J-140	3
74100-818-08	22501-010-03	2MBI200NB-120	3
74100-818-09	22501-010-04	2MBI100J-140	3
74100-818-10	22501-010-05	2MBI150J-140	3
74100-818-11	22501-010-06	2MBI200J-140	3
74100-820-01	24808-670-02	6RI75G-160	1
74100-820-02	24808-670-02	6RI75G-160	1
74100-820-03	24808-691-02	6RI100G-160	1
74100-820-04	24808-691-02	6RI100G-160	1
196445-A01	196420-Q01	FF300R12KE3	3

5. Align the transistor mounting holes with the holes in the heatsink. Insert the new screws supplied with the kit in to the holes in the heatsink (Do Not reuse screws from the old module). Temporarily screw the fasteners to a finger tight position.

6. Consult the mounting screw tightening sequence for your particular module as shown in Figure 1-1. Temporarily torque the mounting screws to 10% of the final torque number shown in Table 1-2.
7. Perform the final torquing of the screws in the rotation sequence shown in Figure 1-1. All screws should be at the final rated torque shown in Table 1-2.

**Figure 1.1**  
**Tightening Sequences**

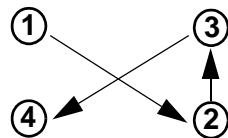
**Two Point Mounting**



Temporary Torque Sequence ① → ②

Final Torque Sequence ② → ①

**Four Point Mounting**



Temporary Torque Sequence ① → ② → ③ → ④

Final Torque Sequence ④ → ③ → ② → ①

**Six Point Mounting**



Temporary Torque Sequence ② → ⑤ → ③ → ⑥ → ① → ④

Final Torque Sequence ④ → ① → ⑥ → ③ → ⑤ → ②

8. After the rated torque has been applied to the heatsink mounting screws, wait 45 minutes and then re-torque the fasteners to the final rated torque again. The thermal grease tends to redistribute in a process called "bleeding". This process tends to decrease the mounting force the screws impose on the backplate as a function of time. The correct magnitude of force needs to be re-established after the time period has passed.
9. When the module is successfully mounted and torqued reinstall the electrical leads and torque the gate and emitter lead connections to the values shown in Table 1-2.

Table 1.2 Torque Requirements

Spare Part Kit Number	Module Part Number	Vendor Part No.	Base Plate Screw Torque	Power Connection Torque
135773	120632	TD61N12KOF	35 lb-in.	35 lb-in.
140142	120782	DD85N12K	35 lb-in	35 lb-in
142493	120782	DD85N12K	35 lb-in	35 lb-in
142505	120632	DT61N12KOF	35 lb-in	35 lb-in
142694	142126	DD89N14K	35 lb-in	35 lb-in
142744	141958	DT61N14KOF-L2	35 lb-in	35 lb-in
74100-818-01	22501-008-01	2MBI50N-120	26 lb-in	26 lb-in
74100-818-02	22501-008-02	2MBI50N-140	26 lb-in	26 lb-in
74100-819-05	194528-Q02	TD142N16KOF	37 lb-in	37 lb-in
74100-819-06	194528-Q02	TD142N16KOF	37 lb-in	37 lb-in
74100-820-05	22501-018-01	TTB6C110N12KOF	37 lb-in	37 lb-in
74100-820-06	22501-018-02	TTB6C110N14KOF	37 lb-in	37 lb-in
74103-167-01	22501-035-01	TD61N12KOF	35 lb-in	35 lb-in
74103-167-02	22501-035-02	TD61N14KOF	35 lb-in	35 lb-in
193434	191404-Q02	TTB6C165N16LOF	37 lb-in	37 lb-in
193982	22501-008-01	2MBI50N-120	26 lb-in	26 lb-in
193983	191451-Q01	2MBI100NC-120	26 lb-in	26 lb-in
194911	191404-Q01	TTB6C135N16LOF	37 lb-in	37 lb-in
74001-409-10	22501-026-02	2MBI150J-120	26 lb-in	26 lb-in
74001-409-16	22501-043-01	2MBI150NC-120	26 lb-in	26 lb-in
74100-818-03	22501-039-01	2MBI75N-120	26 lb-in	26 lb-in
74100-818-24	22501-009-02	2MBI75J-140	26 lb-in	26 lb-in
74100-818-05	22501-010-01	2MBI100NB-120	26 lb-in	35 lb-in
74100-818-06	22501-010-02	2MBI150NB-120	26 lb-in	35 lb-in
74100-818-07	22501-010-04	2MBI100J-140	26 lb-in	35 lb-in
74100-818-08	22501-010-03	2MBI200NB-120	26 lb-in	35 lb-in
74100-818-09	22501-010-04	2MBI100J-140	26 lb-in	35 lb-in
74100-818-10	22501-010-05	2MBI150J-140	26 lb-in	35 lb-in
74100-818-11	22501-010-06	2MBI200J-140	26 lb-in	35 lb-in
74100-820-01	24808-670-02	6RI75G-160	26 lb-in	26 lb-in
74100-820-02	24808-670-02	6RI75G-160	26 lb-in	26 lb-in
74100-820-03	24808-691-02	6RI100G-160	26 lb-in	26 lb-in
74100-820-04	24808-691-02	6RI100G-160	26 lb-in	26 lb-in
196445-A01	196420-Q01	FF300R12KE3	37 lb-in	35 lb-in

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