and all, must be replaced. The cost to replace an integral beam HID headlamp is going to be substantially higher than the cost of replacing a more conventional headlamp. Ford, Stanley, AAMA, GM, and State Farm suggested that NHTSA could facilitate the introduction and acceptance of HID headlamp technology by redefining them as "replaceable bulb headlamps" so that components could be individually replaced.

NHTSA concurs with these comments. There is no safety reason why HIDs can't be used as replaceable bulb headlamps. Manufacturers chose an integral-type design for the initial HID headlamps as a result of NHTSAinitiated amendments to accommodate them and facilitate their introduction. At that time, around 1992, the most expeditious manner was through the modification of the definition for integral beam headlamps, and the addition of combination headlighting systems. NHTSA did not know how to define HID sources as "replaceable light sources.'

GE espoused a contrary position. It finds the relationship between the ballast device for an HID headlamp and the arc source itself to be complex and intricate. As more requirements (e.g., instant start, long life, color control) are placed on the system, the complexity of the ballast, electronics, and light projection system increase by an order of magnitude. Given the present state of arc source technology, GE commented that the industry must further define performance and other enhancements for a "short arc" headlamp and ballast before rulemaking for a non-integral system is initiated. Without a firm industry agreement on basic system requirements, GE concludes that specification of the individual parts and their respective allowable contribution to system requirements is impossible.

However, contrary to GE's argument, Ford presented a regulatory scheme with specific suggested amendments to both Standard No. 108 and the replaceable bulb information regulation, part 564, the effect of which would be to allow use of HIDs as replaceable headlamp light sources in a manner which accommodates GE's concern. NHTSA has reviewed this in great detail, and tentatively concludes that it, for the most part, sets forth a realistic way in which to treat HIDs as replaceable light headlamp light sources. Therefore, the following discussion is based upon Ford's specific suggestions, the European regulatory practice for HID headlamp sight sources, and NHTSA's responses.

Proposed Amendments to Standard No. 108

S4 *Definitions*. A "replaceable light source" is defined as "an assembly consisting of a capsule, base, and terminals that is designed to conform to the requirements of paragraph S7.7" of Standard No. 108. Ford would amend the definition to include the phrase ''separable ballast, if required.'' Because HID headlamps, unlike conventional replaceable bulb units, are operable through ballasts, Ford believes that such an amendment would clearly indicate that HIDs come under the definition of "replaceable light source." However, where the ballast is separable and physically located away from the headlamp housing, it would not be part of an "assembly" of "capsule, base, and terminals," as the term "assembly" is understood. NHTSA has tentatively concluded that there is a better approach, comprised of two parts. The first is to retain the existing definition and propose amendments of paragraph S7.7 pertinent to HID light sources, thus tying it in with the definition of 'replaceable light source'', as quoted above. The second is to propose an amendment of part 564 which would allow the submittal of ballast information to Docket No. 93–11. Section IX of Part 564 appears an appropriate place for the listing of other dimensions or performance specifications necessary for light sources and ballast interchangeability purposes that are not listed in other places within appendix A. For this reason also, an HID assembly would be a "replaceable light source."

S5.5.8 This paragraph specifies, in part, that in an integral beam headlighting system meeting integral beam headlighting photometrics, the lower beam headlamps shall be wired to remain permanently activated when the upper beam headlamps are activated. Ford would add lower beam headlamps "incorporating non-filament light sources" and meeting replaceable bulb headlighting photometrics.

NHTSA believes that this approach would unnecessarily discriminate between filament and non-filament light sources, and that adopting the definition of "filament" shown below would supersede the need to specify "non-filament light sources". This means that an amendment of S5.5.8 would not be needed as Figure 15 already specifically allows the lower beam headlamps of four-lamp replaceable light source headlamp systems to remain activated when the upper beams are operated. Although Figure 17 is silent on the point, this silence has the effect of not

specifying how the lower or upper beam is generated by the headlamp. Thus, the lower beams of two-lamp replaceable light source headlamp systems can remain activated when the upper beams are selected.

The definition that appears appropriate to NHTSA is:

"Filament" means that part of the light source or light emitting element(s), such as a resistive element, the excited portion of a specific mixture of gases under pressure, or any part of other energy conversion sources, that generates radiant energy which can be seen.

S7.5(e)(3)(ii). This relates to headlamp systems comprised of four replaceable bulb headlamps. Ford's recommended revision to this paragraph would limit how replaceable light source headlamps may produce the upper beam, as it would require the HID lower beam to remain on when the upper beam is selected. While this is what proposed changes to European law may require and indeed may be what most manufacturers would choose to do, Standard No. 108 presently permits the lower beam to remain on when the upper beam is used, but does not require it. The reason that a manufacturer might choose to leave the lower beam HID source on is that it is technically complex and expensive to design HIDs that, if extinguished, will quickly re-arc after being extinguished during beam switching. If the HID had difficulty reestablishing an arc after switching from the upper beam, the headlamp would not produce light, a high risk situation, even if possibly a transient one. Given the liabilities inherent in such an instance, NHTSA anticipates that manufacturers will provide systems in which an HID lower beam remains activated during upper beam use.

Because S7.5(e)(3)(ii) allows the manufacturer of a vehicle with replaceable bulb headlamp systems a choice of whether or not to extinguish the lower beam while the upper beam is activated, it provides maximum flexibility for designers of replaceable bulb headlamp systems, whether or not they incorporate lower beam HIDs. NHTSA believes that as long as an HID headlamp complies with applicable photometric requirements, it should be allowed to use present headlamp configurations without restriction.

New paragraph S7.5(e)(3)(iii). Ford would add a new paragraph S7.5(e)(3)(iii) relating to four lamp replaceable bulb headlamp systems to read:

The upper beam of a headlamp system whose lower beam headlamps are equipped