

GENERATION 1 PATENT Safety Review 4 Grader Access System – Access



Introduction

- This presentation sets out information on and results of an evaluation on Access Innovations (AI) improved grader access system
- AI is a Queensland based company designing and manufacturing improved access systems for earth moving equipment, at this time concentrating on graders of all types from smaller models right up to the 24H. Their main product at this time is the 16H and 16G models. AI holds an international patent over the system.
- AI has completed preliminary design work on the newly released CAT 16M grader as well.
- Alan Miskin, BHPB Global FRCP Facilitator for SME, was invited to review the system newly installed on a CAT 16H grader bound for Rio's Blair Athol Mine in Queensland
- Rio specifies this access system for all of their Australian operations with a population of over 50 machines, the oldest of which has 60K+ hours of field service
- Ballpark cost is US\$48K per machine

Access Innovations – Contact Information

- Michael Magnussen is the Company Owner. He was formerly an experienced final trim grader operator and has incorporated operational and safety aspects into the design. This includes preserving the operators clear and unobstructed vision of his work area.
- He arrived on the job one night to discover the off coming shift grader operator slumped on the ground after falling onto the blade when dismounting – this incident prompted him to design an improved grader access system

<http://www.accessinnovations.com.au/about.htm>

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System features

- Pneumatic powered stairs on both sides at rear of machine
- Pneumatic powered walkway sections that lift to enable operator work area vision and eliminate fowling due to tandem drive movement and machine and blade articulation
- All powered sections interlocked with park brake
- Door sensors to halt movement of powered sections when doors are opened
- System uses existing CAT pneumatic pump but adds larger air accumulation tank giving 5 actuations without recharge
- Simple control circuit with no computers or other electrical components to fail
- When activated handrails protect operator for all field access and service points
- Rubber mounted handrails to prevent handrail cracking



Overall view of machine – no tyres fitted yet



RHS front view – system lowered



RHS - System raised





RHS rear view – system lowered



RHS rear view – system raised



LHS rear view – system lowered

LHS front view – system lowered





RHS rear view – system raised

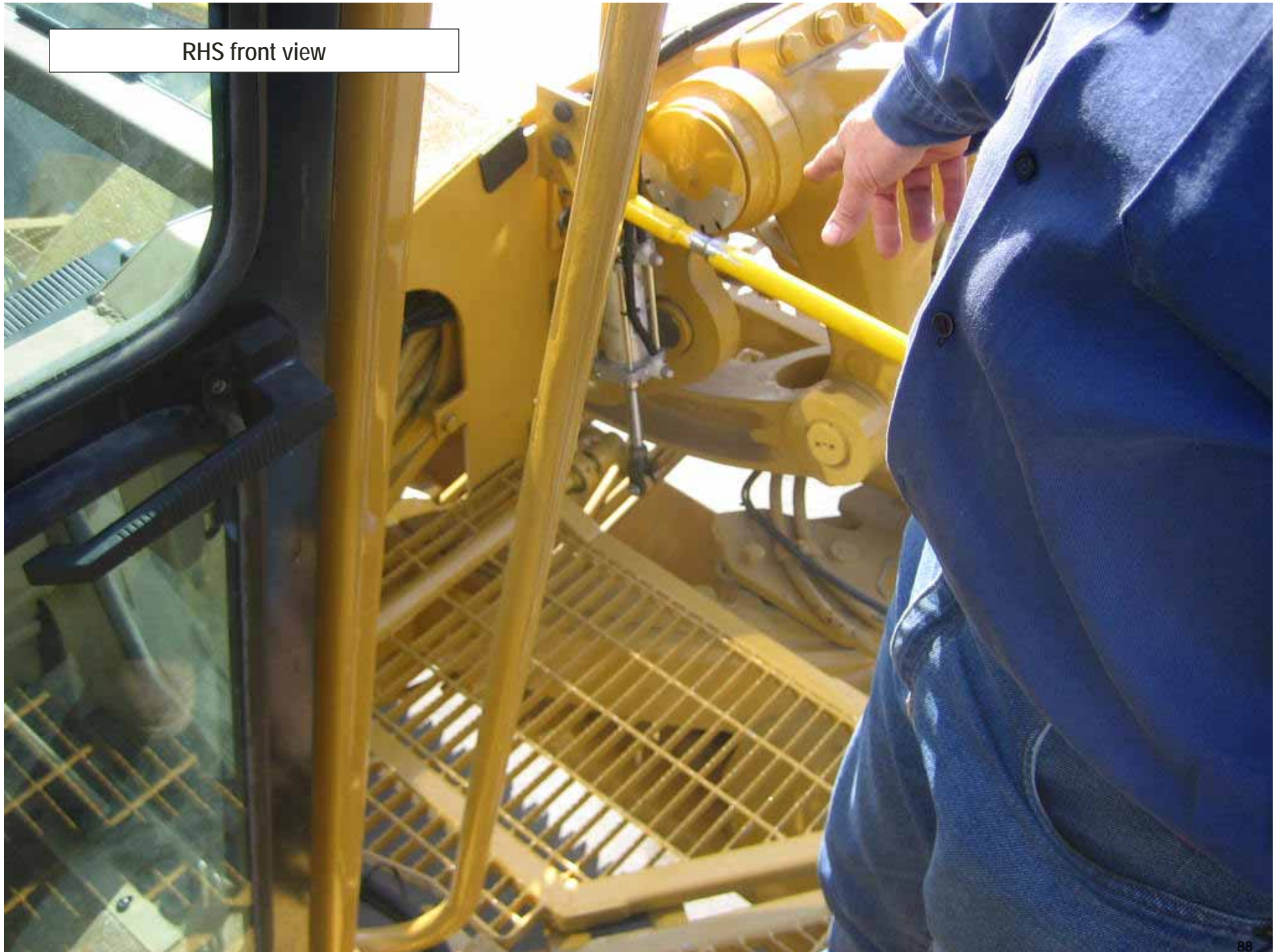
Access for side window cleaning is easy



Access for front window cleaning is easy



RHS front view



Front gooseneck area



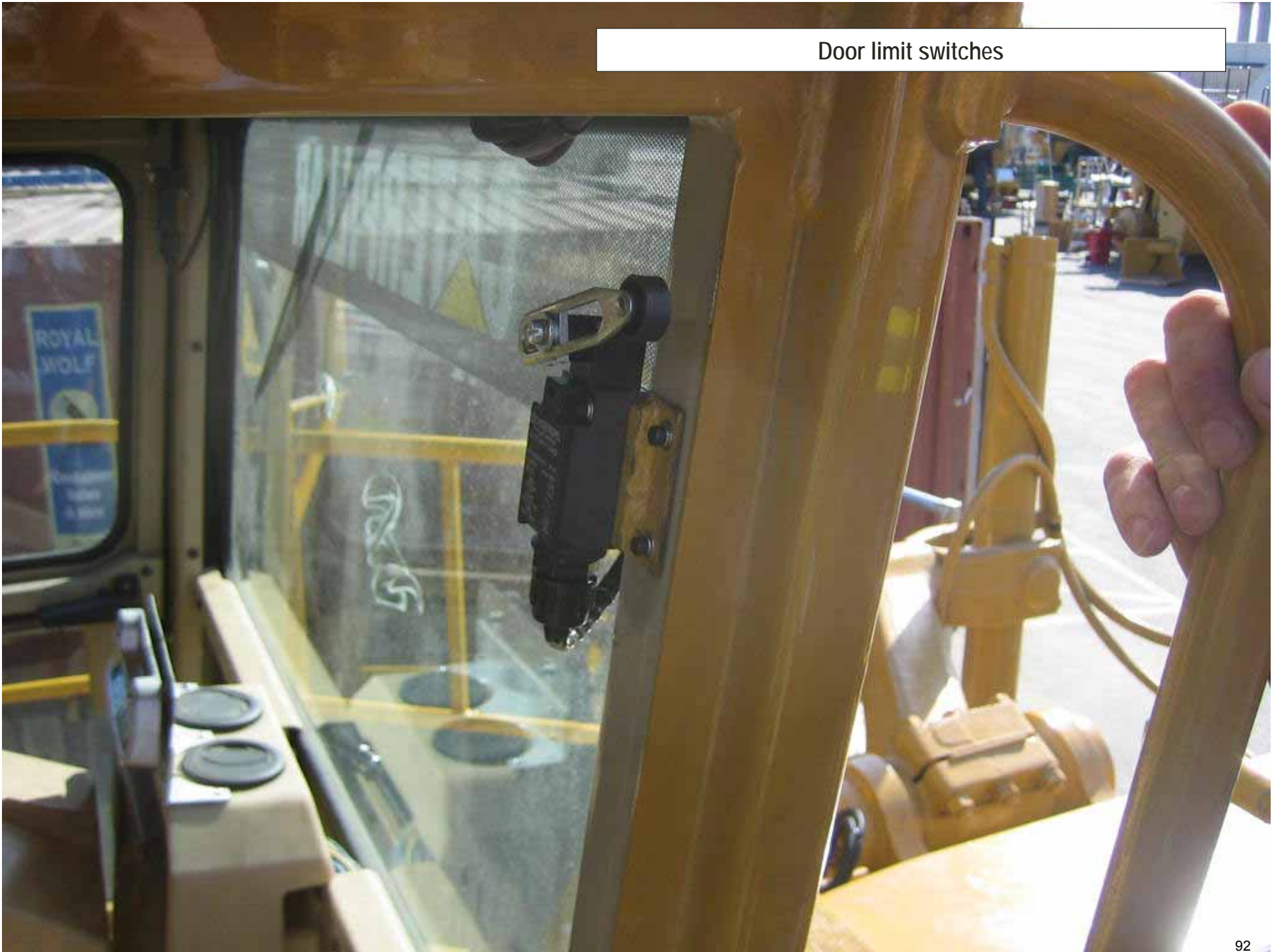
Access to engine area is easy



RHS view looking forward



Door limit switches



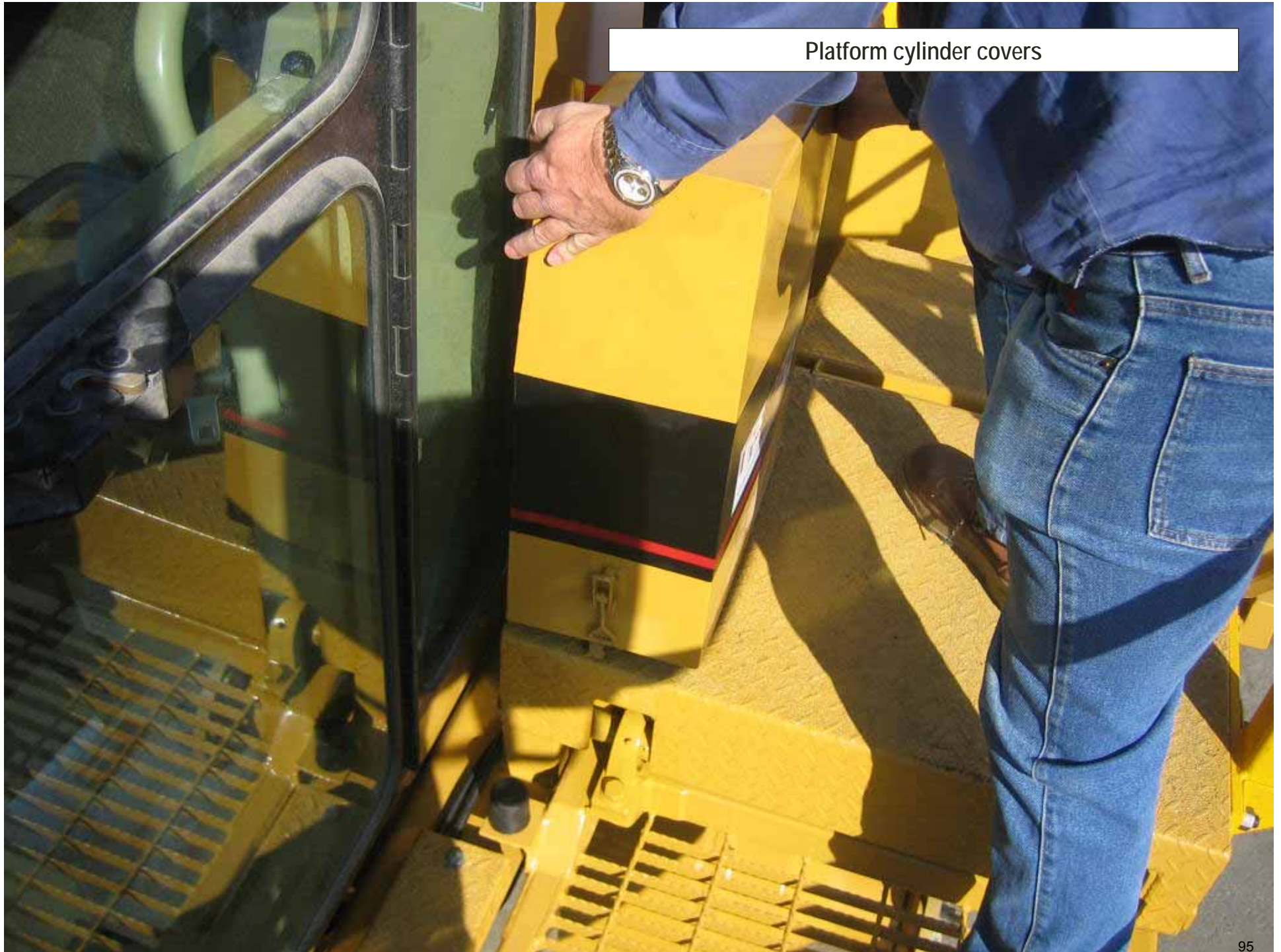
RHS looking rearward



LHS looking rearward



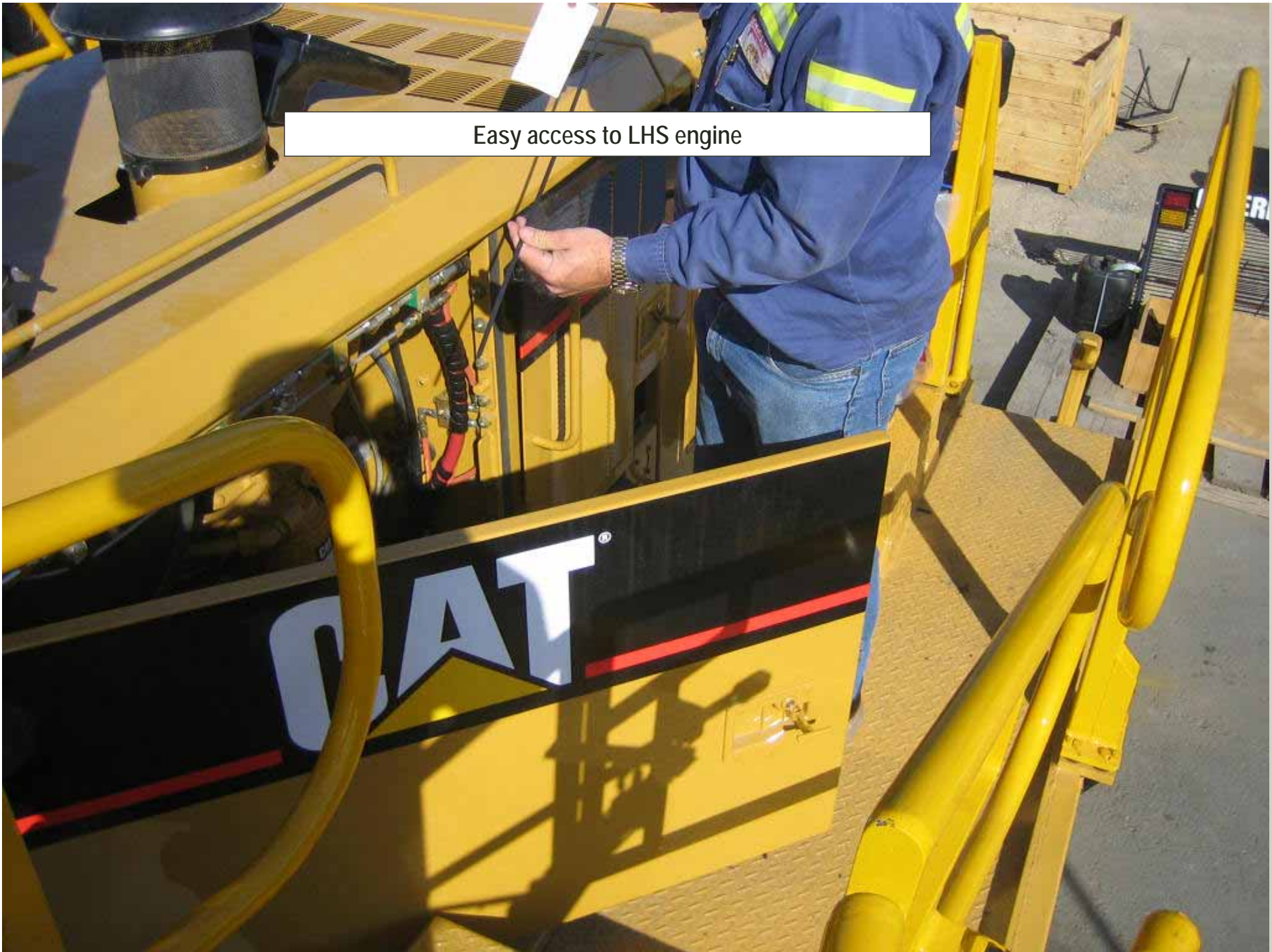
Platform cylinder covers



Platform cylinder cover removed



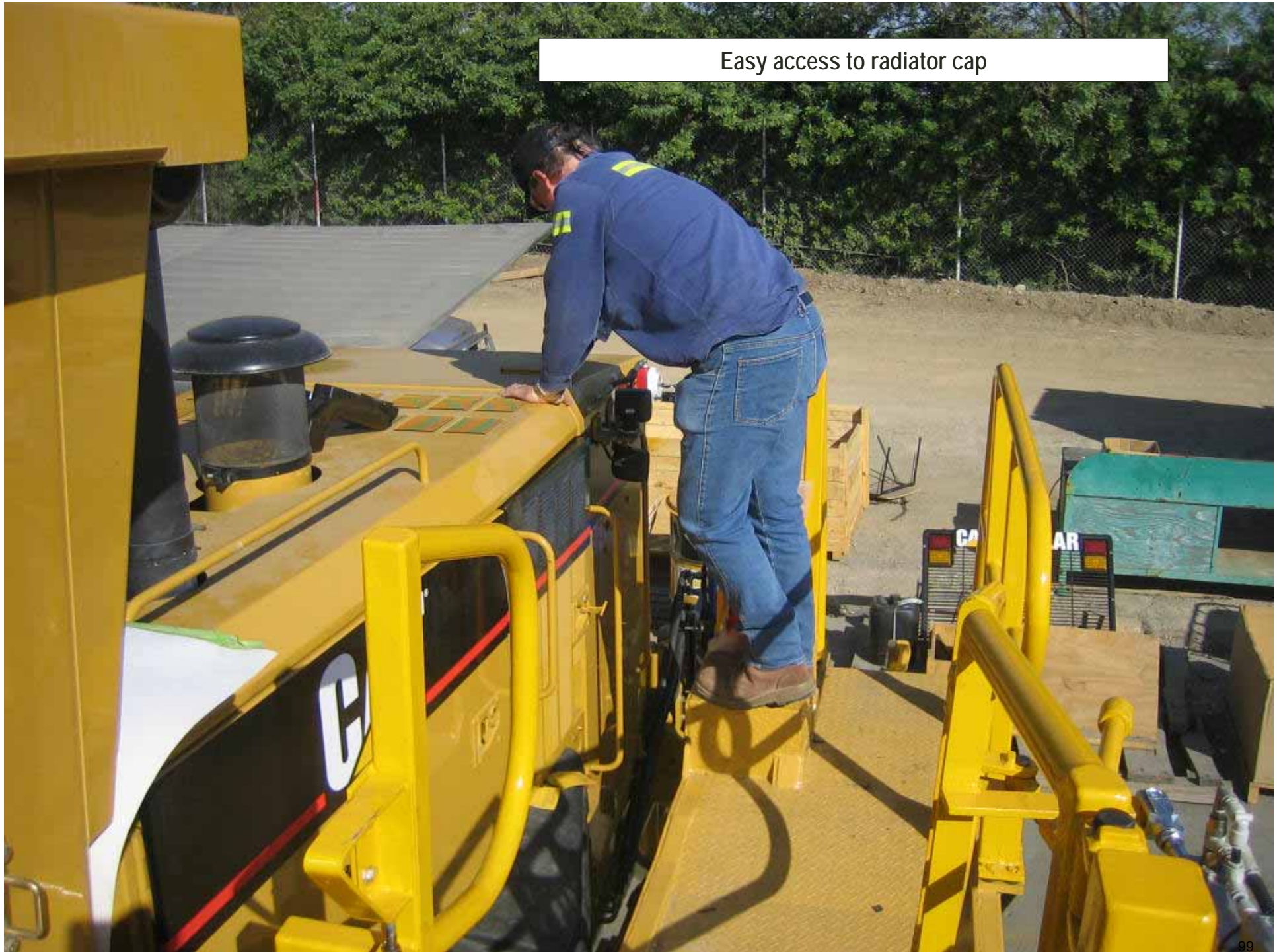
Easy access to LHS engine



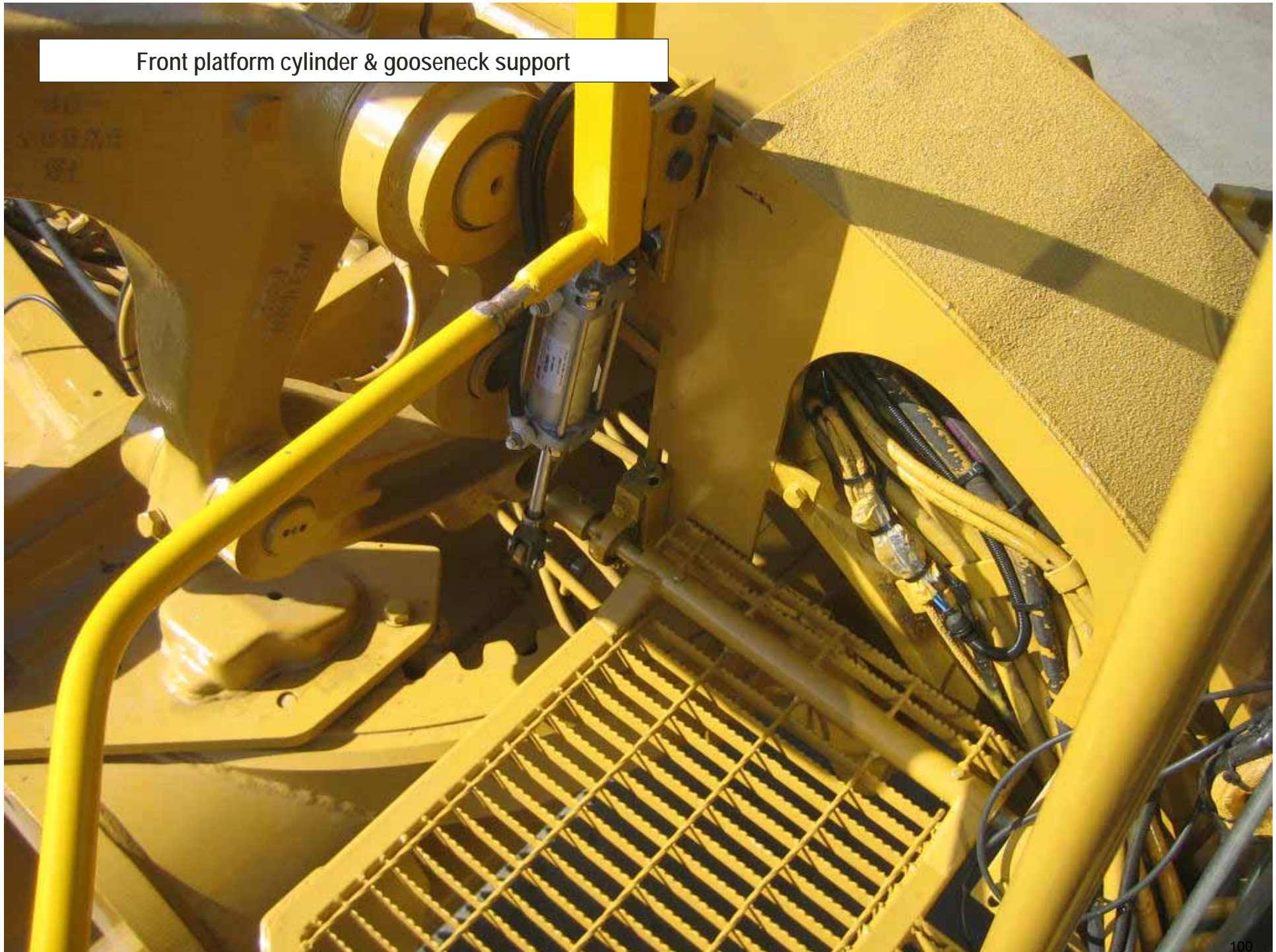
Easy access to LHS engine



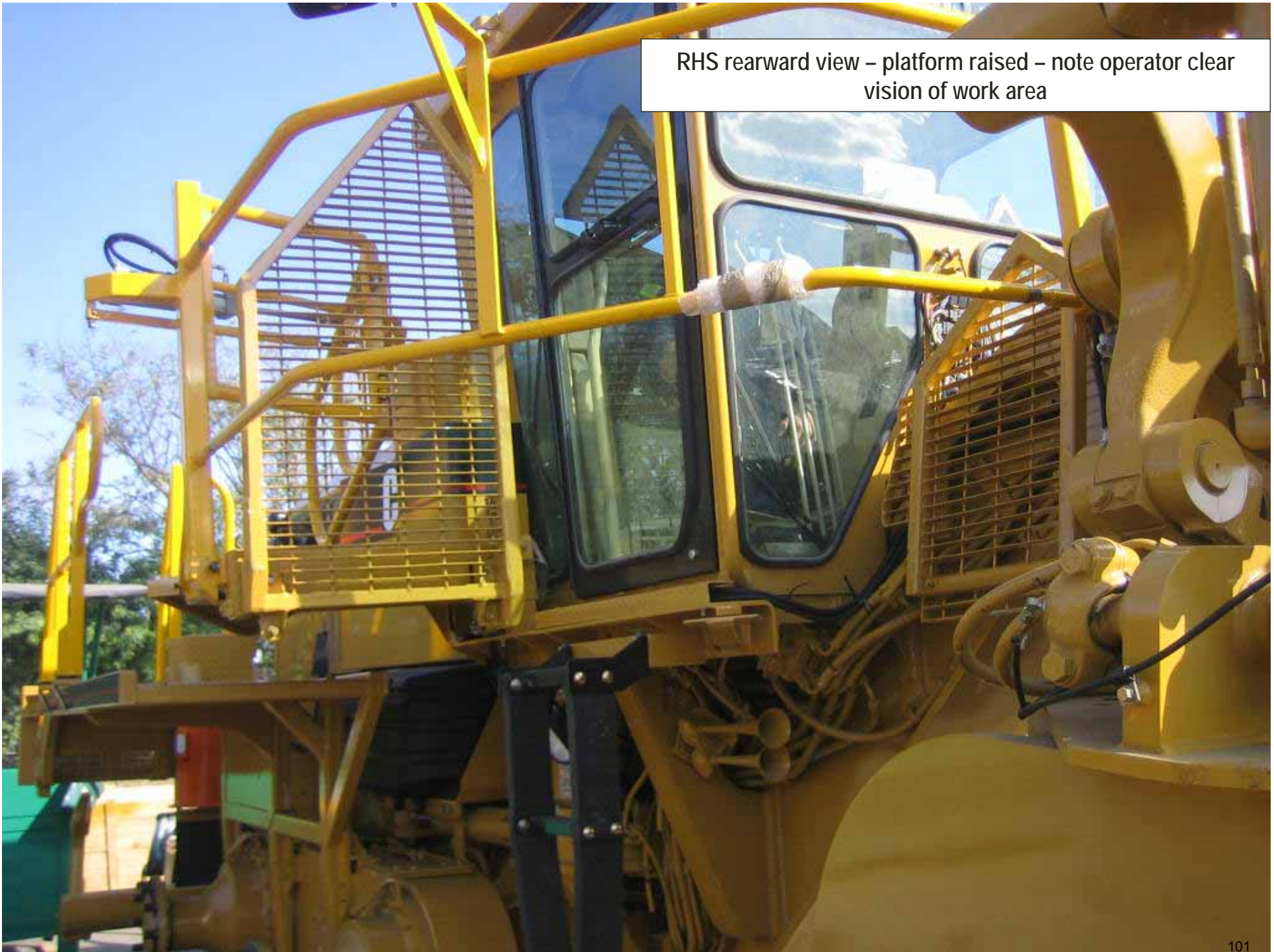
Easy access to radiator cap



Front platform cylinder & gooseneck support



RHS rearward view – platform raised – note operator clear vision of work area





RHS operator vision lowered and raised positions





LHS operator vision lowered and raised positions



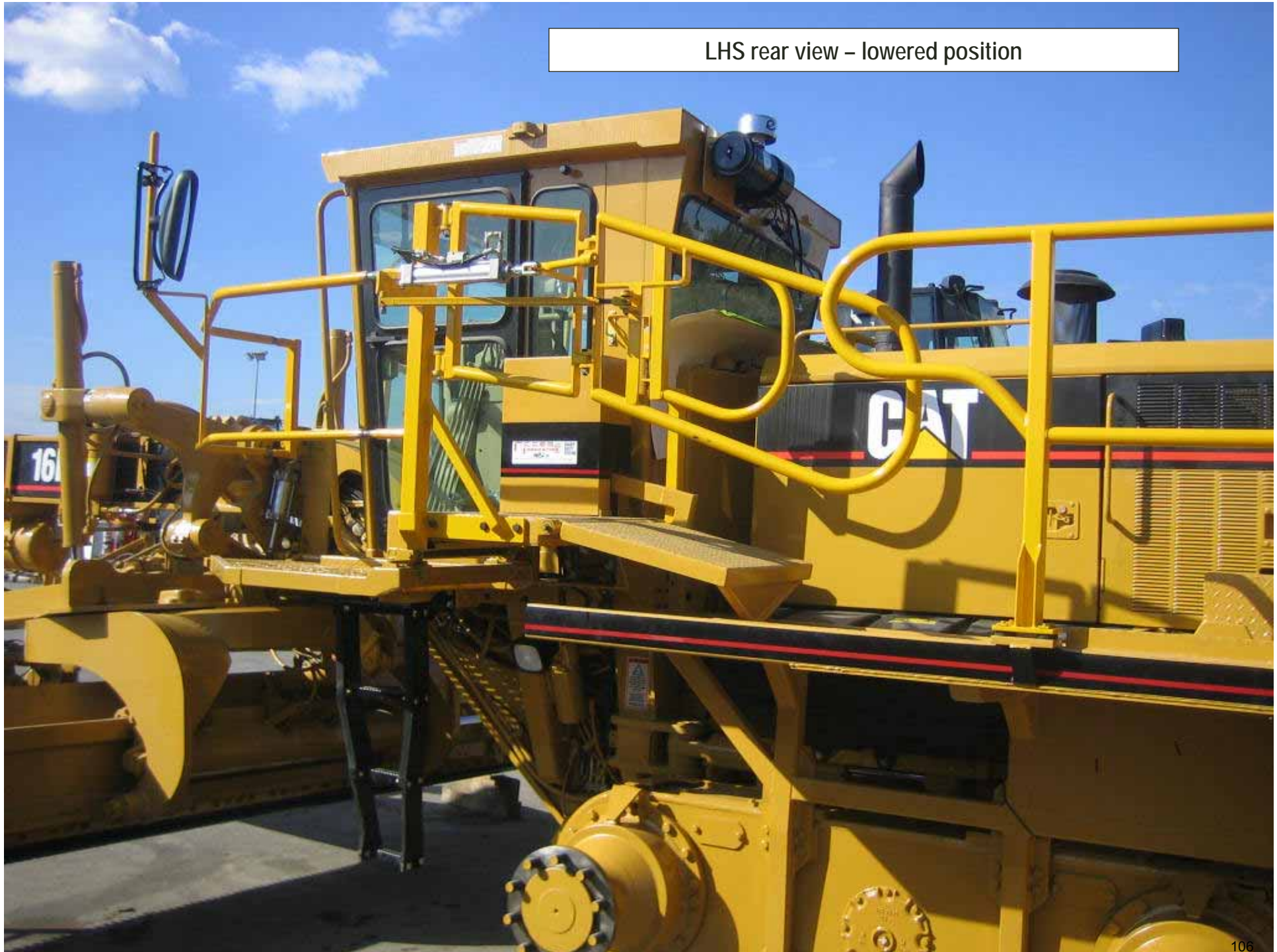
LHS rear view – lowered position



LHS rear view – raised position



LHS rear view – lowered position



LHS rearward view – lowered position



LHS view looking rearward – note wide mirror position





Tripple leg mounts onto tandem case – mounting blocks are jig positioned and welded into place



Side supports bolt into frame and not into ROP's

Front platforms are supported by a gooseneck saddle – see
pneumatic cylinder to left



Handrails are slip joints which are welded when mounted onto the machine





Handrails are rubber mounted which has proven to eliminate cracking

Supplementary air tank with lockable isolation point



Conclusions

- This is not a simple fixed platform and handrail combination
- It appears to be well thought out, designed and constructed. Its cost appears to be justified with the operator well catered for in terms of vision.
- It covers all field service access and working at height issues associated with graders.
- It is interlocked with the park brake to lower when the park brake is engaged and raise when the park brake is released. The platform and stair actuation is halted when either door is opened. This helps solve our park brake application issue.
- There is nothing to prevent an operator from opening the door without the park brake engaged – other than obviously visually noticing that they platforms are not lowered into place. I suggest also incorporating the Hastings Deering park brake alarm system. Note that the system does not touch the OEM rubber ladders, these remain in place as an emergency egress in the event of system failure.



Conclusions

- In my opinion this system represents the safest currently available grader access system.
- Some may argue that the rear facing stairs place the operator at the ground in the line of fire if the machine begins rolling backwards. I am not concerned by this as that exposure is not that great and a person could easily step sideways. It should also be remembered that the system ensures the park brake is engaged when the system lowers. An alternate sideways stairs would place the operator in the line of fire of other machines in an equipment park situation.
- The CAT 16G&H model park brakes are air release so that in the event of system air loss the brakes would indicate warning followed by application. The air systems are quite high capacity and can cope with fairly major air leaks without loss in functionality.
- Rio are not fools, they have chosen this system as their standard. I recommend we at BHPB follow suit.



Conclusions

- System weight is around 1.8 tonne and does not impact ROP's certification (according to AI)
- Michael Magnussen has expressed a desire to work with CAT on their 16M access improvement.
- I intend pursuing this matter with CAT with a view to achieving a similar high standard of access on the M series graders.

