EA03-022

STRICK CORPORATION

1/29/04 LETTER TO ODI

RESPONSE TO REQUEST

6, 7, 8, 9, 10, 11, 12, & 13

PART 2 OF 2

EA03-022

STRICK CORPORATION

1/29/04 LETTER TO ODI

RESPONSE TO REQUEST
6

Response to Request # 6

Identify and describe all meetings, forums and conferences at which Strick personnel, and/or agents, were present concerning greased wheel-ends from January 1, 1997 to present. State in detail all information received by, or communicated from Strick, that relate to, or may relate to the alleged defect.

For each such event, include the following information. Submit all requested information in an "Event packet," similar to the format requested in Number 5.

a-Event name, date, location, and names of Strick personnel (include title) in attendance;

Dana meeting
May 14, 1998
Location Crowne Plaza Hotel, Atlanta, GA
Ron Zubko (Engineering manager)
Jerry Clontz (Warranty manager)

Xtra Corporation
August 11,1998
Location Xtra Lease, St. Louis, MO
Jerry Clontz (Warranty manager)
Ron Zubko (Engineering manager)

b-Names, addresses, and telephone numbers of any company, entity or organization in attendance at each such event;

Records for Dana meeting attached
No records available for Xtra

c-Produce copies of all documents that relate to, or may relate to the alleged defect, that were obtained, produced or provided by Strick at each such event. This includes the Agenda, Sign-in sheet(s), handout(s), Strick personnel notes, formal notes from event secretary, any additional communications dispersed to event attendees afterwards, etc.; and

All available records are attached

d-Provide a description of how the information obtained, produced, provided, or discussed at each such event, was communicated, used and dispersed throughout Strick, Strick's suppliers, and Strick's customers.

Strick held meetings with each work cell to review the process for installation of wheel ends and fill levels of grease. A letter was sent to all Strick customers with trailers manufactured with grease as a wheel end lubricant. See attached letter.

DANA SPICER TRAILER PRODUCTS DIVISION • MONTGOMERY PLANT

Spicer Trailer Products (Dana) is notifying you of a meeting to discuss characteristics, application and fill procedures of the Mobilith SHC 007 Grease. Dick Morrow from Mobil will lead the discussion. The meeting will be held May 14th from 1:00 P.M. to 5:00 P.M. EST at the Crowne Plaza Hotel in Atlanta, Ga.. A tentative agenda for the meeting is attached.

The Crowne Plaza provides free shuttle service to and from the airport. A shuttle will run ever 15 minutes.

A buffet lunch will be provided from 12:00 to 1:00 in the hotel restaurant.

The address for the Crowne Plaza is:

Crowne Plaza Hotel (Atlanta Airport)
1325 Virginia Ave.
Atlanta, Ga. 30344

(404) 768-6660

Due to Limited meeting space we are asking that attendance be limited to 2 people from each Facility.

Please call either Wade Ahers (334) 286-7065 or Allen Peacock (334) 286-7021 to confirm your attendance. If you have any issues that you would like added to the agenda for this meeting, these can be faxed to either Wade or Allen at (334) 286 7048 or Dick Morrow at (703) 754-0586

Post-it® Fax Note 7671	Date [illegible]
To Ron Bubko	From Allen Peacock
Co./Dept. STRICK	Co. DANA
Phone #	Phone # 334-286-7021
Fax # 215-949-4779	Fax #

TENTATIVE AGENDA FOR MOBILITH 007 GREASE EVALUATION MEETING

I. Mobilith SHC 007 Grease Characteristics
   a) Flow and serviceability characteristics
   b) Temperature characteristics
   c) Extended service characteristics
   d) Testing and evaluation reports

II. Product Installation Recommendations (past, present and future)
   a) Bearing prep
   b) Seal prep
   c) Spindle prep
   d) Hub chamber prep
   e) Hubcap prep
   f) Grease Quantity required

III. Wheel Set-Up Procedures (past, present and future)
   a) Hub types (Steel, Aluminum, etc..)
   b) Spindle types ("D" style, "P" style)
   c) Hubcap types
   d) Wheel bearing endplay limits
   e) "Preset" systems
   f) Venting, Equalization

IV. Preventative Maintenance Recommendations (past, present and future)
   a) Service intervals (time and mileage accumulation)
   b) Procedure for checking
   c) Effects of oil contamination with 007
   d) Effects of water contamination with 007
   e) Color change conditions/indicators

STRICK

June 19, 1998

STRICK CORPORATION
STRICK FINANCE CO.

225 Lincoln Highway
Fairless Hills
Pennsylvania, USA
19030.0009
215.949.3600

VAN DIVISION

501 North Polk Street
Monroe, Indiana
46772.0277
219.692.6121
Fax 219.692.6622

Dear Valued Customer:

In the past few months, several of our customers have reported unexpected problems with wheel ends using Mobilith SHC007 synthetic grease. We have become aware of instances where an inadequate amount of grease reaching the bearings has apparently led to bearing failure. The purpose of this letter is to share some information with you and to request your attention to this matter in order to prevent problems with your wheel ends.

1. When the matter was first brought to our attention we reviewed our processes to confirm that we have been installing a consistent amount of grease in accordance with the manufacturer's recommendations. Our review disclosed that we have at least eight different documents on file from Mobil each of which has slightly different instructions. In view of this, while we believe that we have followed the manufacturer's recommendations, we must note that these recommendations have changed over time. We also wish to note that our standard axle manufacturer has different installation instructions than Mobil recommends.

2. In the course of investigating this situation, we came to understand that some customers have not been checking lubricant levels in their wheel ends. We want to advise you that Mobil has now published service and inspection intervals and procedures for wheel ends using their product that must be followed. We understand that they require inspection about every 100,000 miles. We also note that there is evidence that some components of the product dissipate to some degree.

3. While we want to attempt to meet the requirements of our customers and recognize that changes can be positive, we do not recommend and have not recommended grease as a wheel end lubricant in the production of new trailers. We recommend 90 weight gear oil for wheel end lubrication, which is the Strick standard and has been for many years. In view of the growing evidence that Mobilith SHC 007 will not meet our customer's expectations, if you wish us to continue to use this product, or other synthetic lubricants, on new production we will need written direction from you as to how much lubrication to install. We do not want to hold ourselves out as experts.

We intend to continue to support all our customers' efforts to learn more about this and other new lubrication products that are available on the market. If you have comments or questions regarding this issue please let us know and we will try to help you find expert answers.

Sincerely,

Ronald L. Zubko

Ronald L. Zubko

ron zubko, 10:32 AM 5/15/98, Mobil axle lube

Return-Path: <zubko@monroe.stricktrlr.com>
X-Sender: zubko@monroe.stricktrlr.com
Date: Fri, 15 May 1998 10:32:16
To: williams@monroe.stricktrlr.com
From: ron zubko <zubko@stricktrlr.com>
Subject: Mobil axle lube
Cc: puchino-sr@monroe.stricktrlr.com, katz@monroe.stricktrlr.com, koelewyn@monroe.stricktrlr.com, zwickel@monroe.stricktrlr.com, schmidt@monroe.stricktrlr.com, clontz@monroe.stricktrlr.com

Clontz and I attended a meeting in Atlanta on may 14 at the invitation of
Dana Corp. to attempt reach an industry resolution of the axle lube problem
with Mobil SHC007 synthetic semi-fluid grease.
Attending were reps from: Dane,Utility,Wabash,Stoughton,Dorsey T/M, Fontaine, Mobil, Dana, Meritor, Webb,Stemco, Chicago Rawhide, Holland,Henkel, NOK, Timken, ConMet and Eaton.
No sales pitches, discussions of pricing or competitive info was allowed by
protocol aggreement of the attendees before the meeting started. Mobil staff will issue the meeting minutes to the attendees. I have a copy of the
sign in sheets with all attendees listed.
The meeting was conducted by Mr. R.C. Morrow, the applications engineer
that has been primarily responsible for getting the Mobil 007 product into
the trucking industry during the last 10 years. He started with Oren Summar
at Carolina Freight with trials that began in 1987. He claims that some of
the original trailers have operated 8-10 years with no problems. These are
TP axles.
Morrow gave an overview and short history lesson of axle lube evolution and
outlined his companies position on axle lube.
Mobil says oil is the best lube and synthetic oil is the best oil.
Transmission fluid would give the best bearing performance, but it leaks
easilly. The group discussed the related issues; venting of axle ends, venting of hubcaps, seal performance and hub design differences. Mobil chemist gave a summary of SHC007 properties and limitations. A video showing axle end lube proceedure and a discussion of the problems caused by
Mobil documents with conflicting data and instructions followed.
Axle component recomendations were given by Dana, Meritor, Holland, Conmet

ron zubke, 10:32 AM 5/15/98, Mobil axle lube

and Webb. They all basically sing the same tune: check every 1000 miles,
replace every year or 100,000 miles and when seals or brakes are replaced.
It was generally agreed this covers their back side and no one does what
they recomend, particularly with SHC007.
The OEM group recounted many horror stories about trailers with failed wheel ends, wheel end losses, fires and burned up trailers. Little agreement was reached between the various sides on the cause of the problem. Mobil contends every instance of failure they have seen was caused
by insufficient grease in the hub with TN axles.. OEMs maintain the grease
was installed and somehow disapates. Mobil says if only the bearings are
packed and no grease is put in the hubs the axle will run 100K to 200K depending on the service. Meritor claims tests show the grease evaporates,
Mobil says no, only a little at first, 1-2%,then it stops. Utility says if
the bearings are OK with no lube for 200K miles why are trailers with 400K
miles now failing. Mobil says its a hub design problem that starves the
outer bearing on TN axles with smaller outer bearings or we didn't put enuf
in. Various OEMs claim it runs out on the floor when its put in. Dana says
testing has shown it doesn't floe at all. They have a cup of it upside down
for 2 months and its still in the cup. Dana Canada says in cold weather it
congeals and stays in the hub cavity, Mobil say yes it can.
Bottom line: we all disagree on what is the cause. Mobil is taking the position that we are not capable of installing the correct amount. The NEW
draft publication of Mobil instruction
procedure states the hub must have a MINIMUM of 40% and MAXIMUM of 50% of
the hub filled to insure outer bearing lubrication. They then go on to say
the hub must be filled up to the bottom of the axle spindle and to consult
the hub manufacturer for this volume. Webb says lawyers outnumber engineers, so they won't publish a guide. (Too many combinations).
Mobil says check for leaks during PM and after 100K but before 200K pull
the wheel ends and be sure there is adequate grease in the hub and

ron zubko, 10:32 AM 5/15/98, Mobil axle lube

replenish as neccessary, especially in axles with smaller outer bearings.
Wabash thinks pumps cause cavitation in the drums and metering valves have
grease farts, so sometimes not enuf is installed. We are all having problems because two to three winters have passed, bearing damage in cold
weather due to lube hardening has occurred.
As y'all can see we got a rehash of old news, a couple of new theories and
not much progress. Mobil suggested forming a task force and checking more
axles. My opinion is to strongly recommend to our customers NOT to install
the product in their axle ends and install 2# and waive warranty if they do
want it
installed. Jerry may have a different opinion on this subject.

EA03-022

STRICK CORPORATION

1/29/04 LETTER TO ODI

RESPONSE TO REQUEST
7

Response to Request # 7

What percentage of new Strick semi-trailers leave the manufacturing plant via:

a-roadway; or

100%

b-railroad.

0%

For railroad departures, provide the VINs of the Strick Trailers transported by that method.

EA03-022

STRICK CORPORATION

1/29/04 LETTER TO ODI

RESPONSE TO REQUEST
8

Response to Request # 8

Describe Strick's system for tracking grease type used in their wheel-ends. In addition, for each container of Mobil SHC 007 grease used in the production of the subject vehicles, provide the following information:

a-Mobil's tracking identification number;

No records on file

b-The date(s) the container(s) of Mobil SHC 007 grease was received at Strick's assembly plant;

Furnished all available receipts from receiving, only available back to 2002

c-The date(s) Strick placed the container(s) of Mobil SHC 007 grease on line for production use;

No records on file

d-The earliest date(s) the empty Mobil SHC 007 grease container was replaced, emptied, or removed from Strick's production line; and

No records on file

e-VINs of the semi-trailers that received Mobil SHC 007 grease from each container.

No records on file

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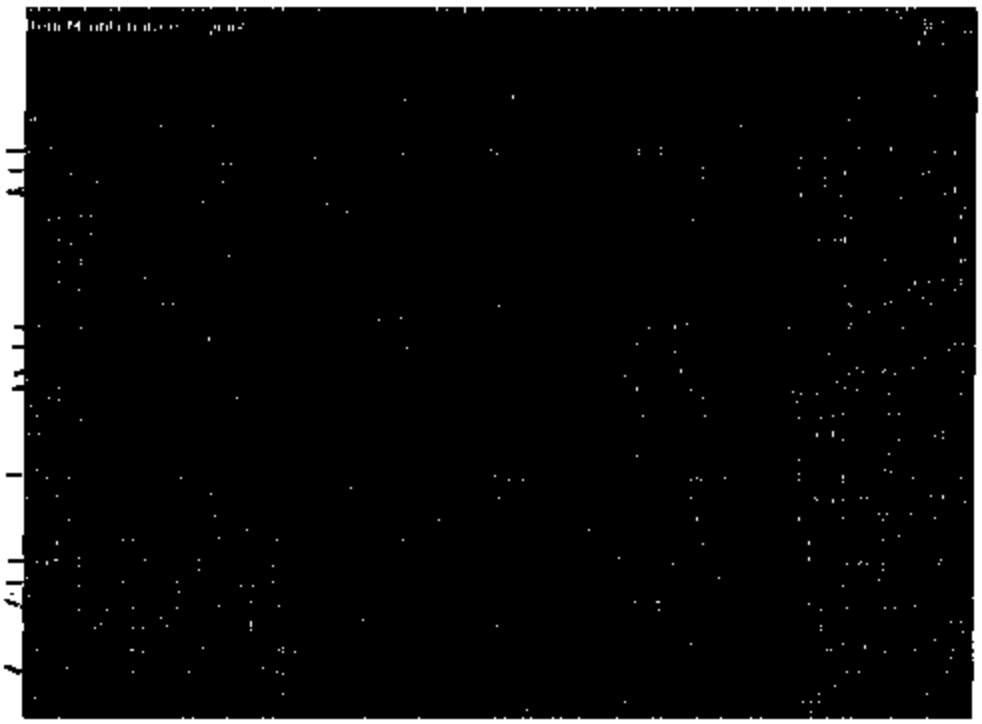

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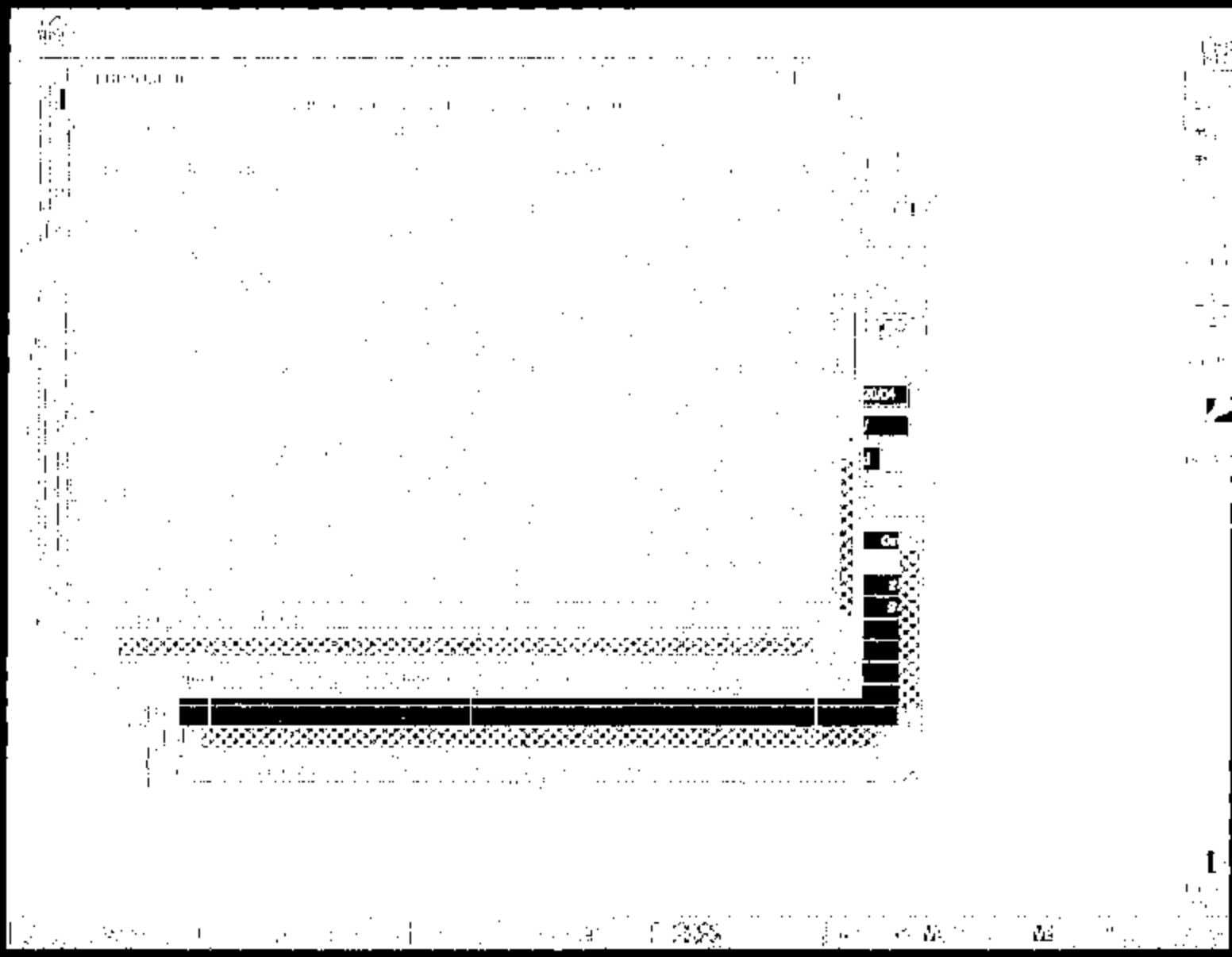

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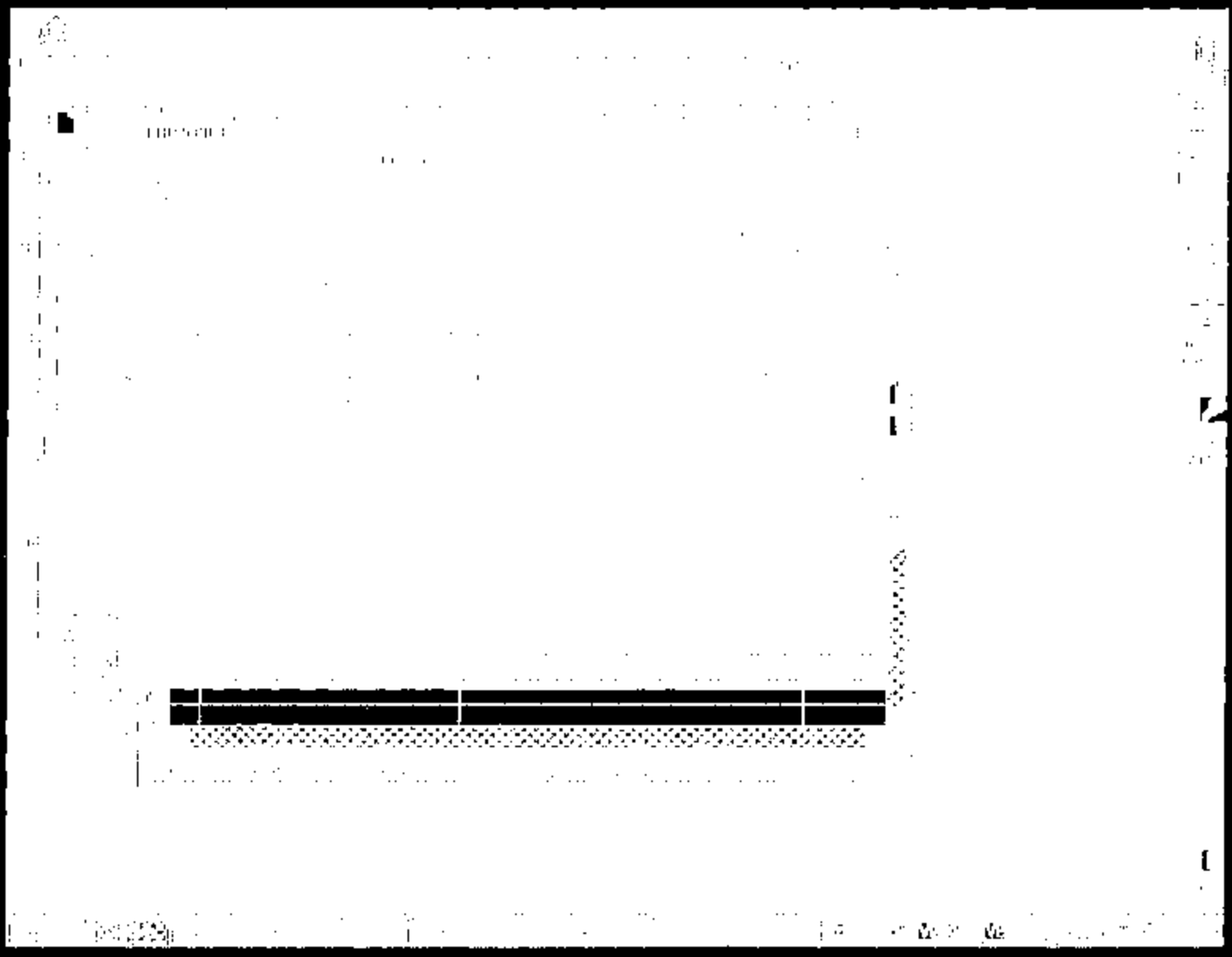

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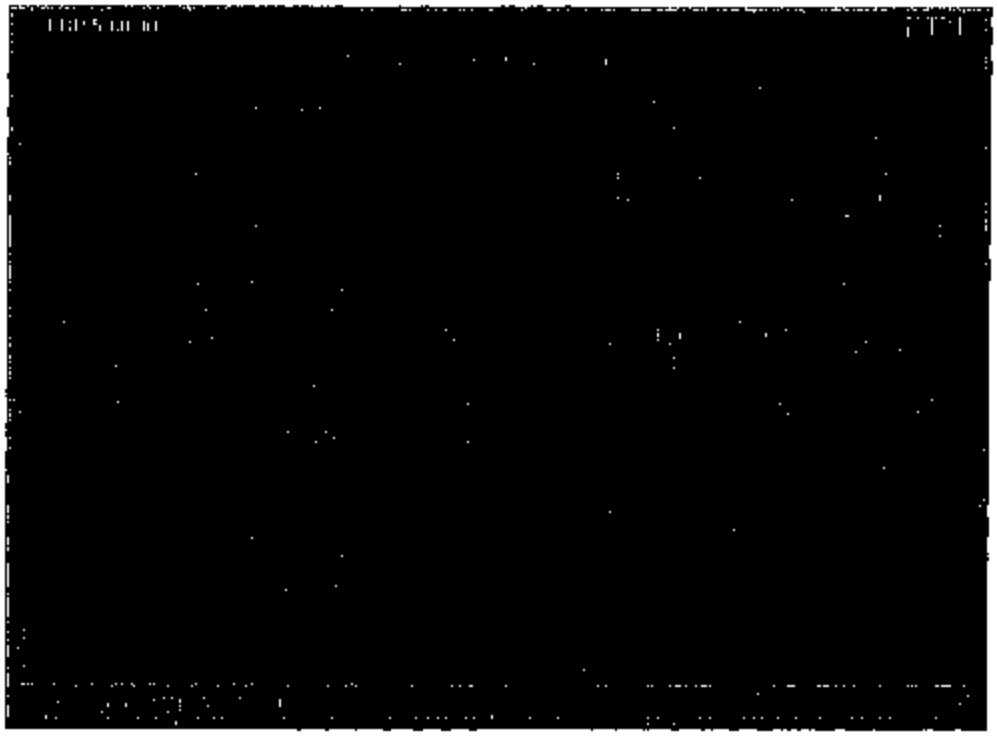

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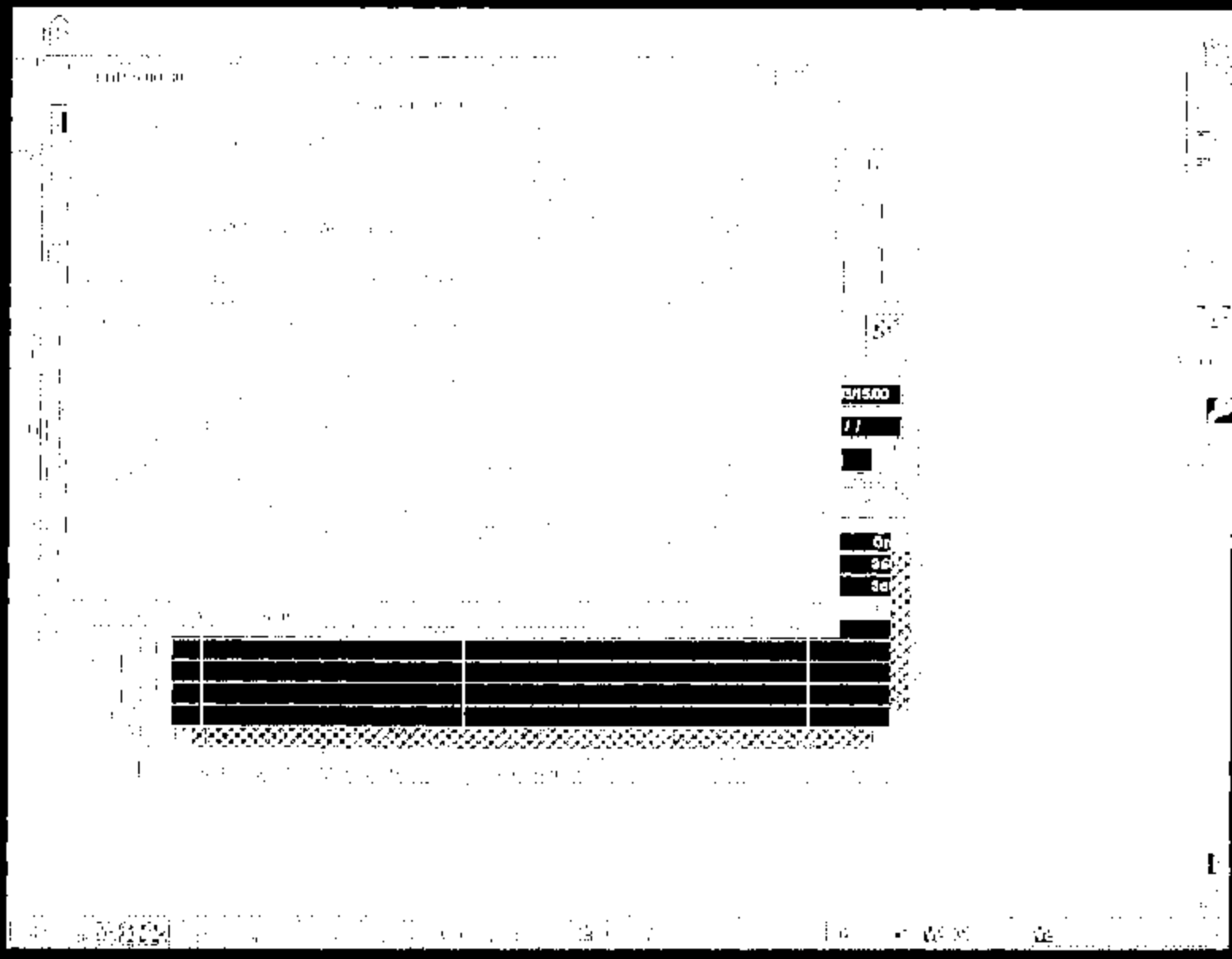

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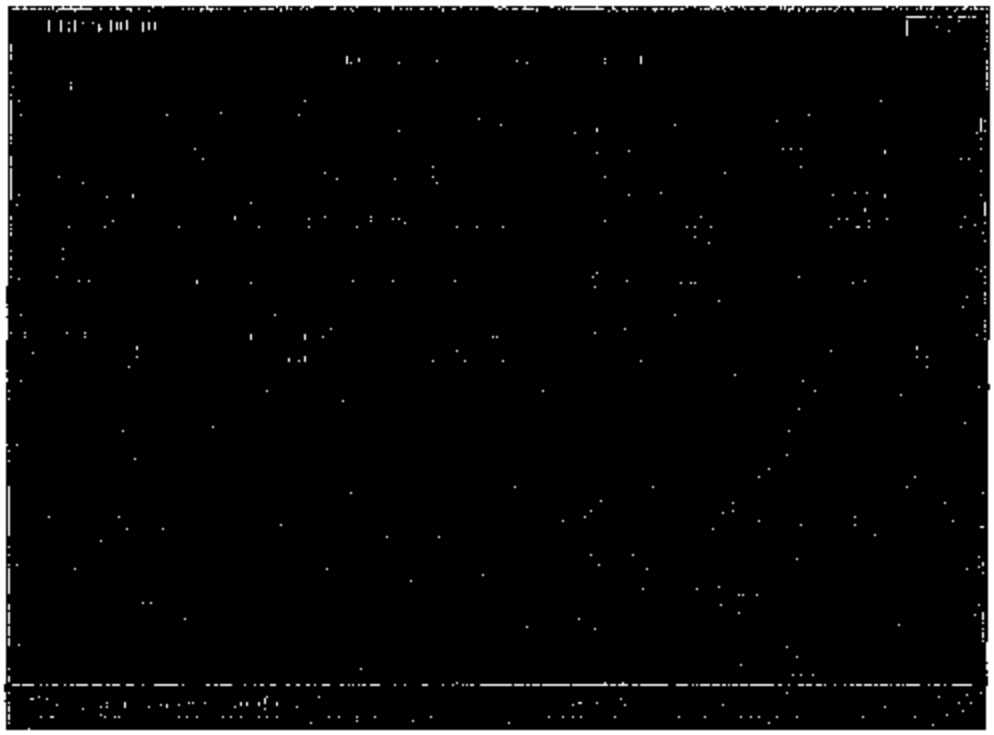

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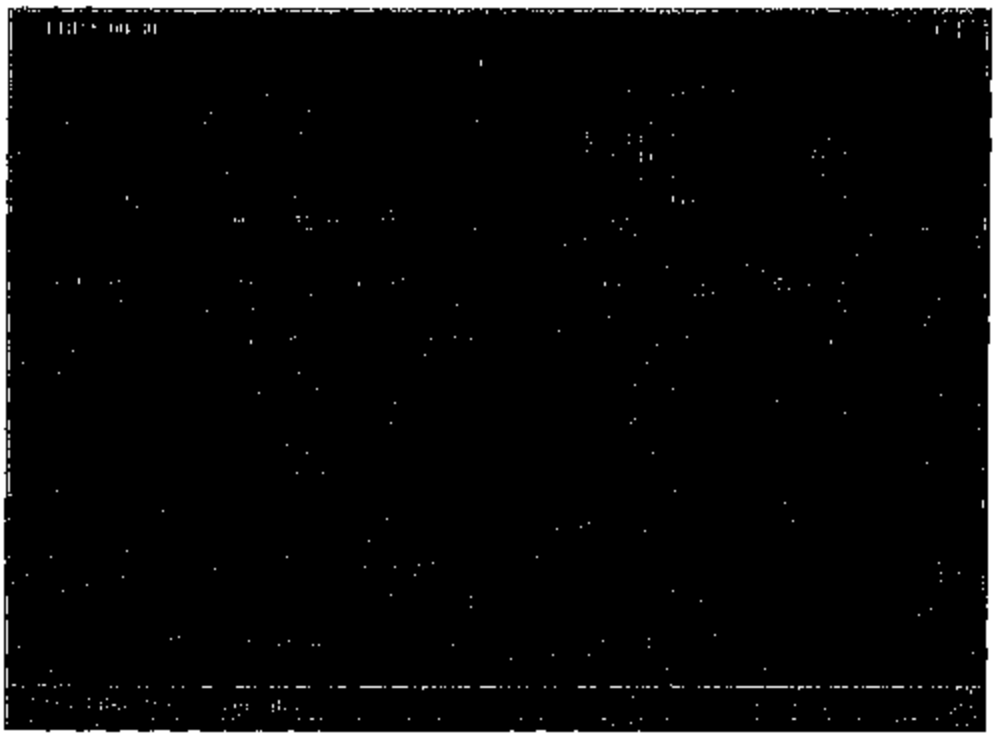

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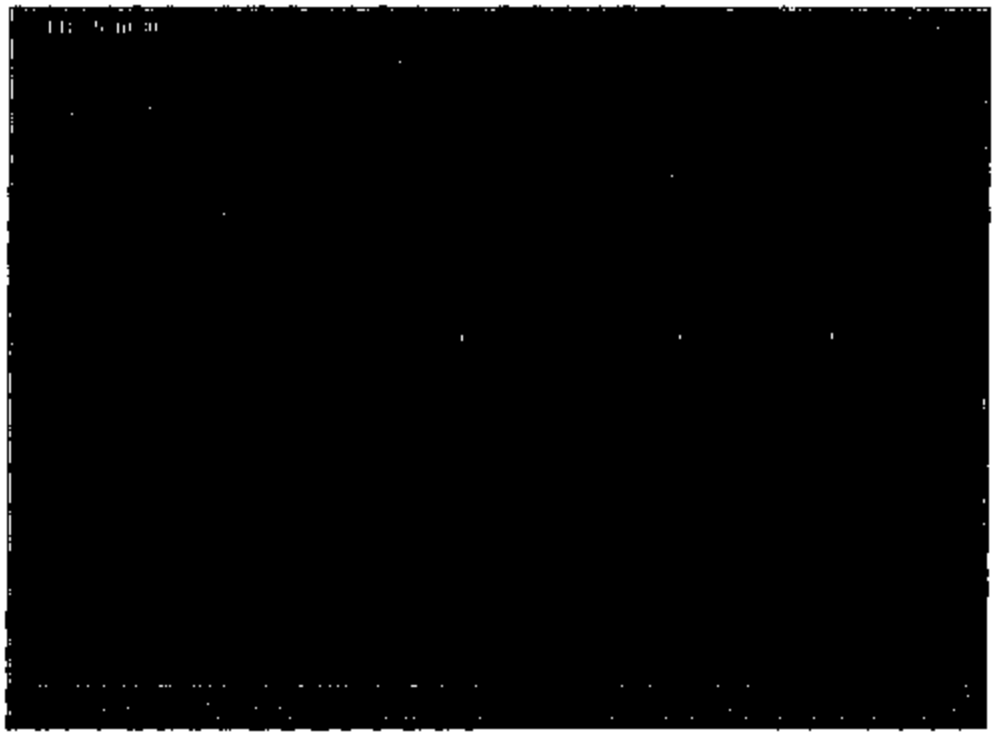

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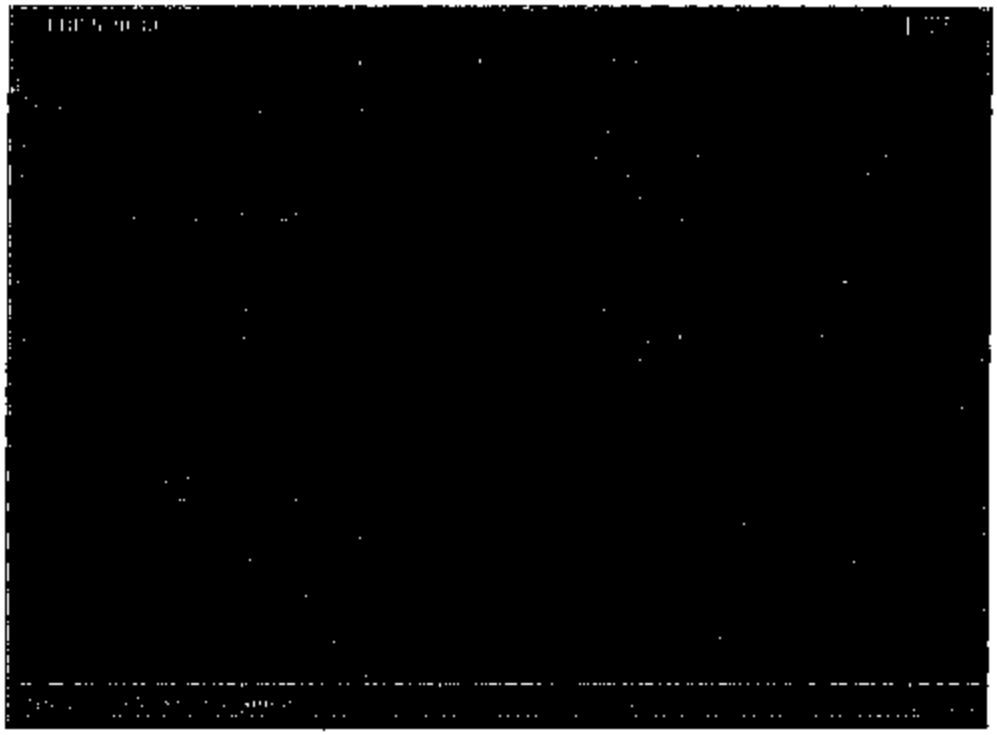

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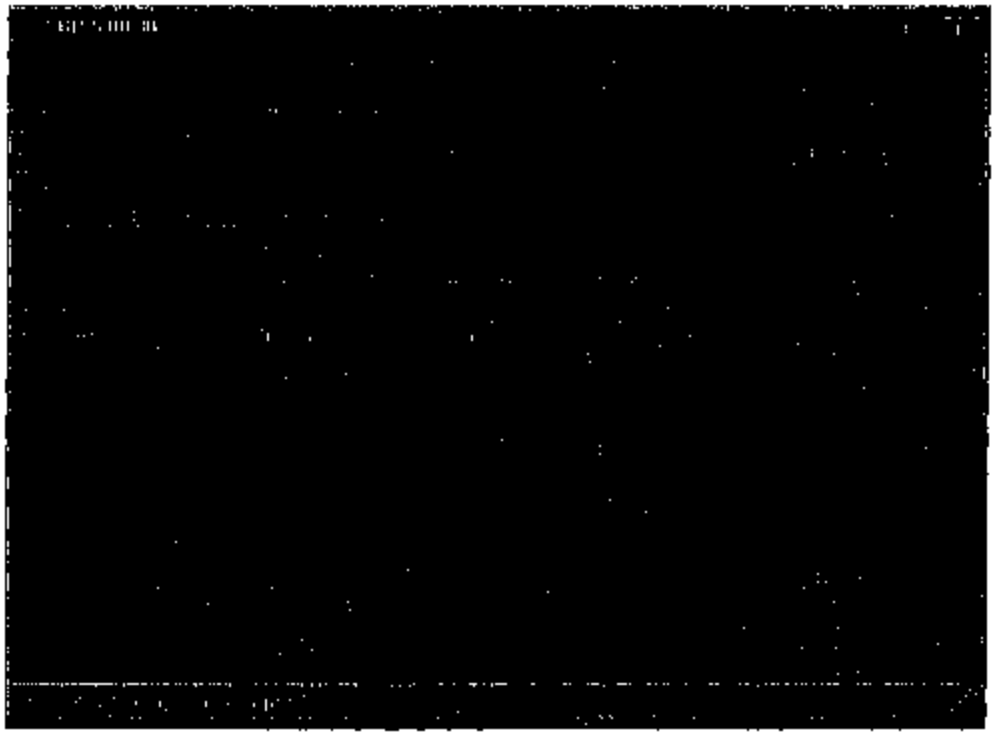

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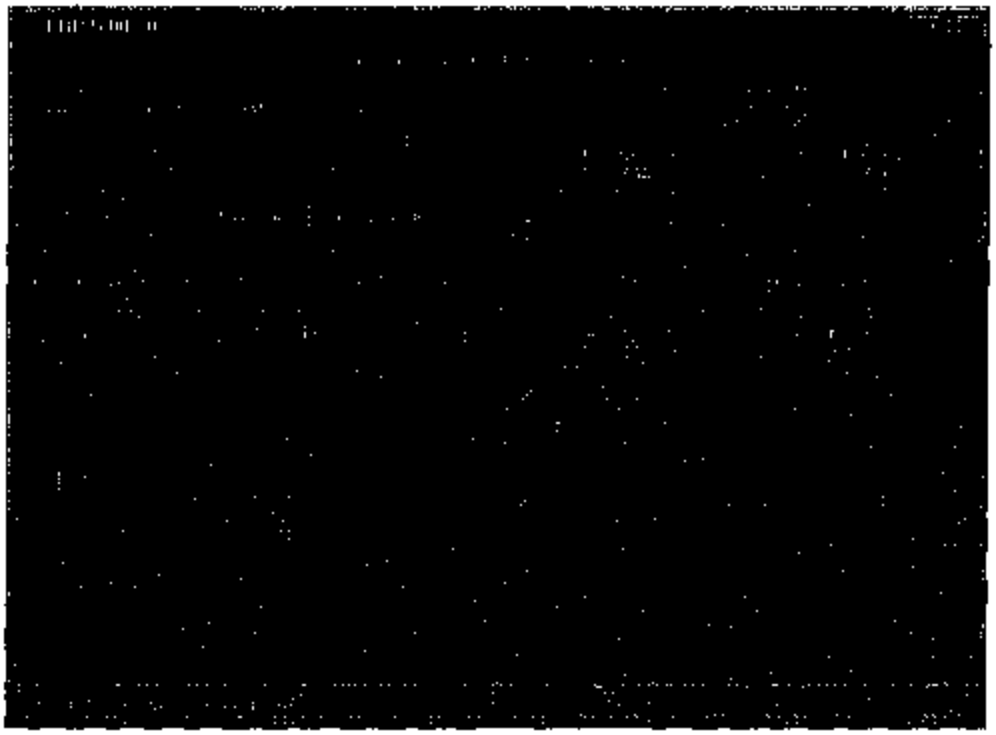

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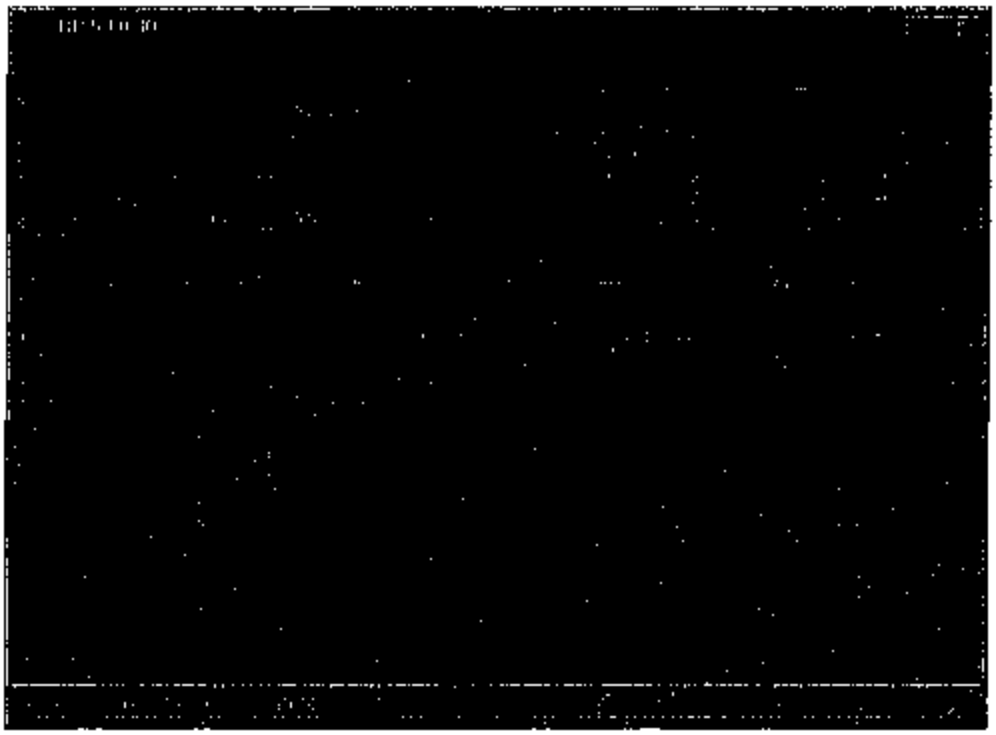

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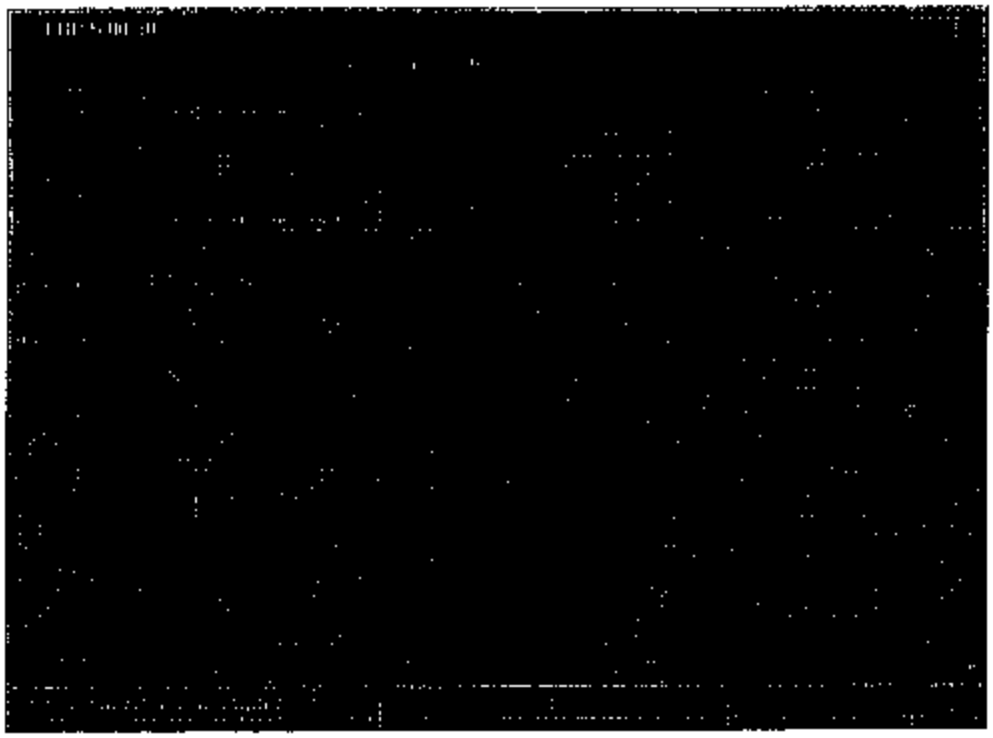

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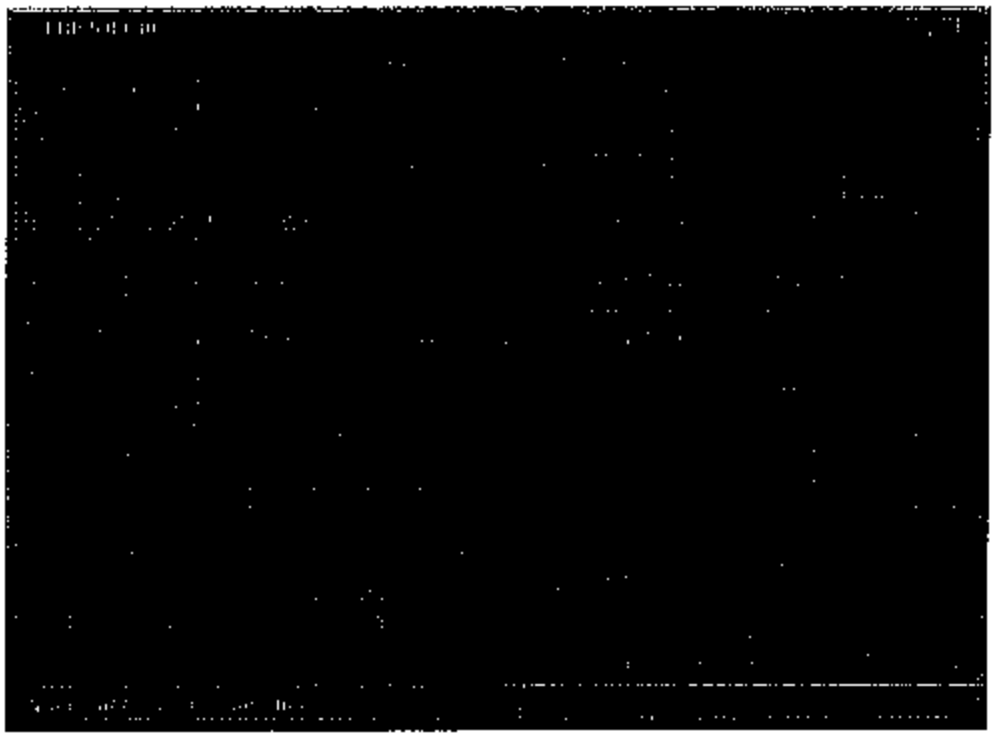

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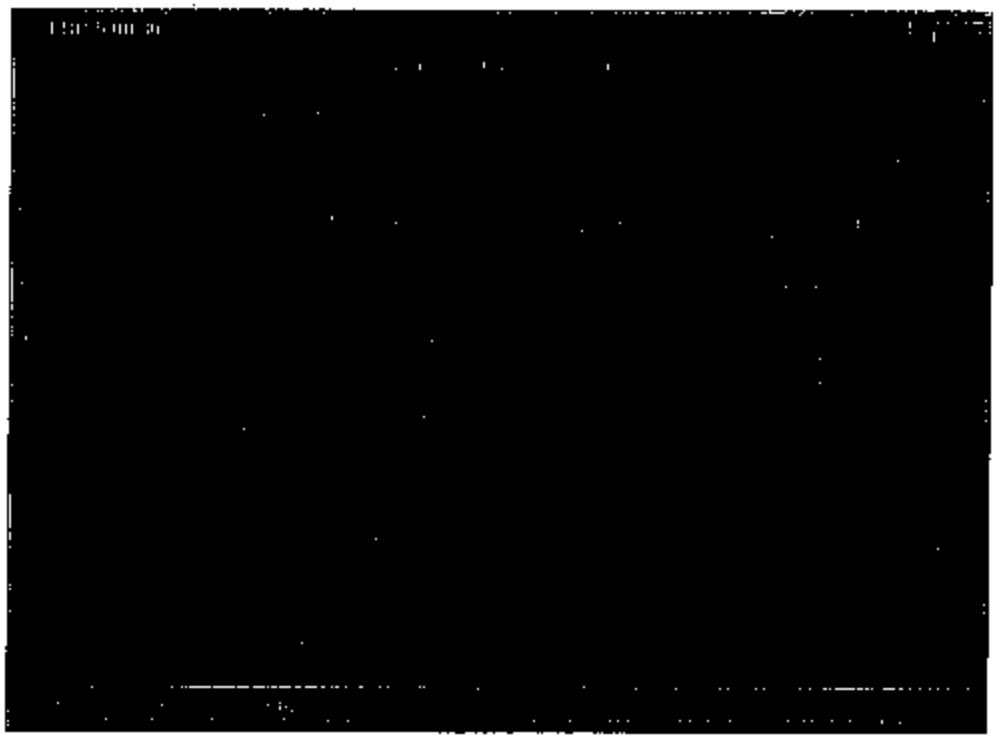

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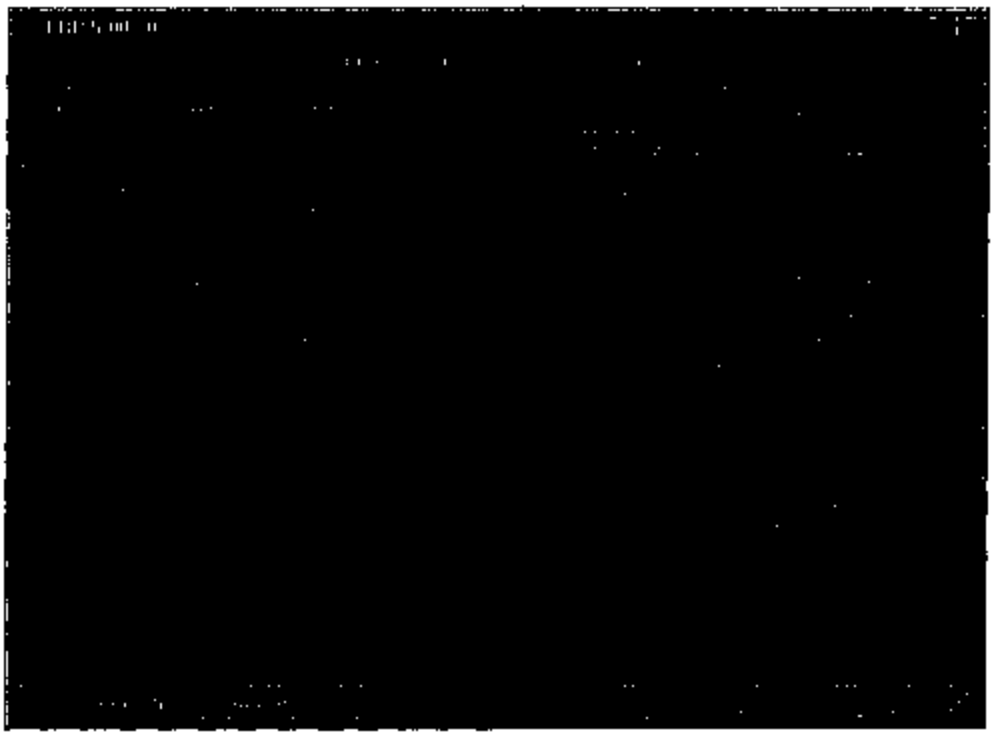

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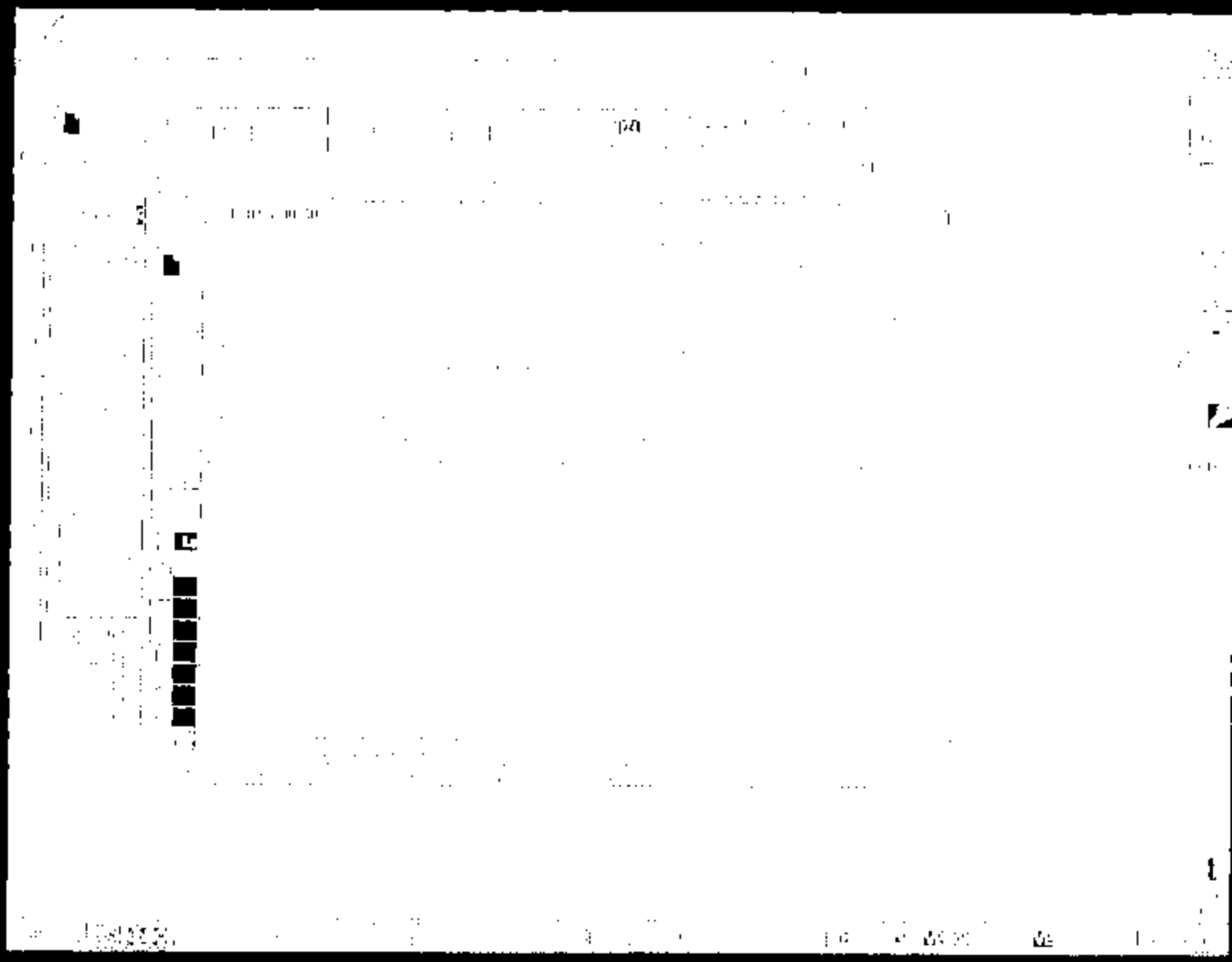

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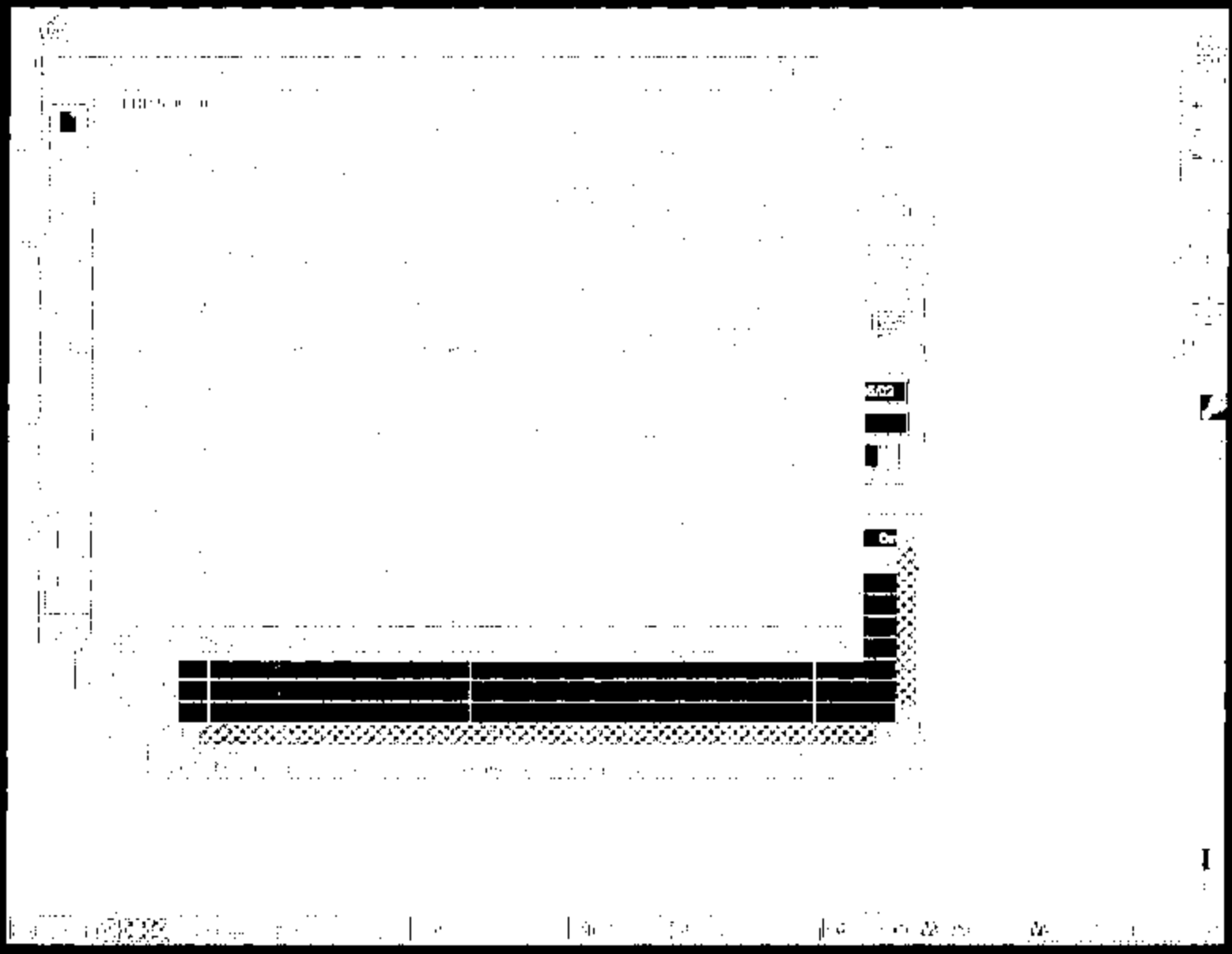

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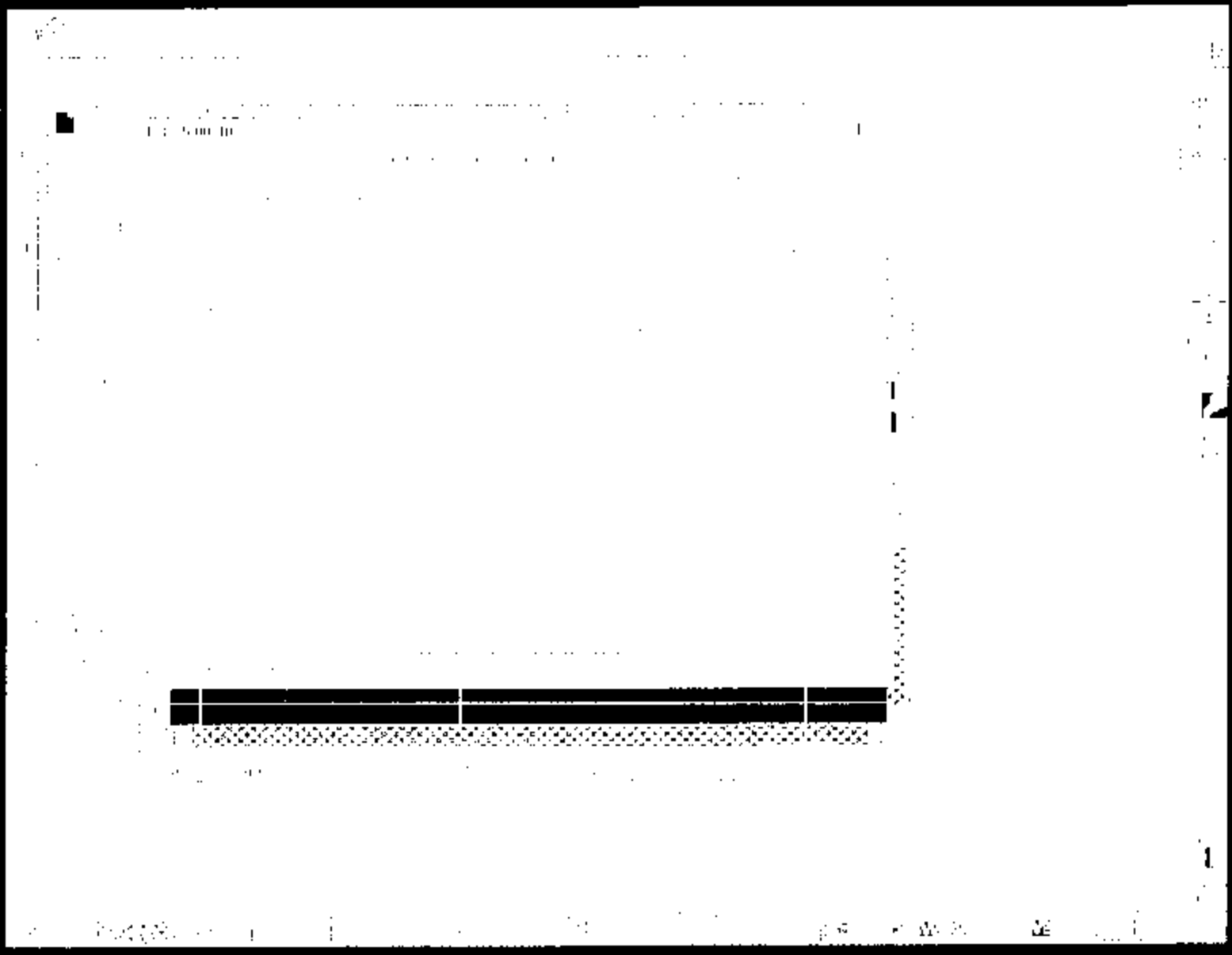

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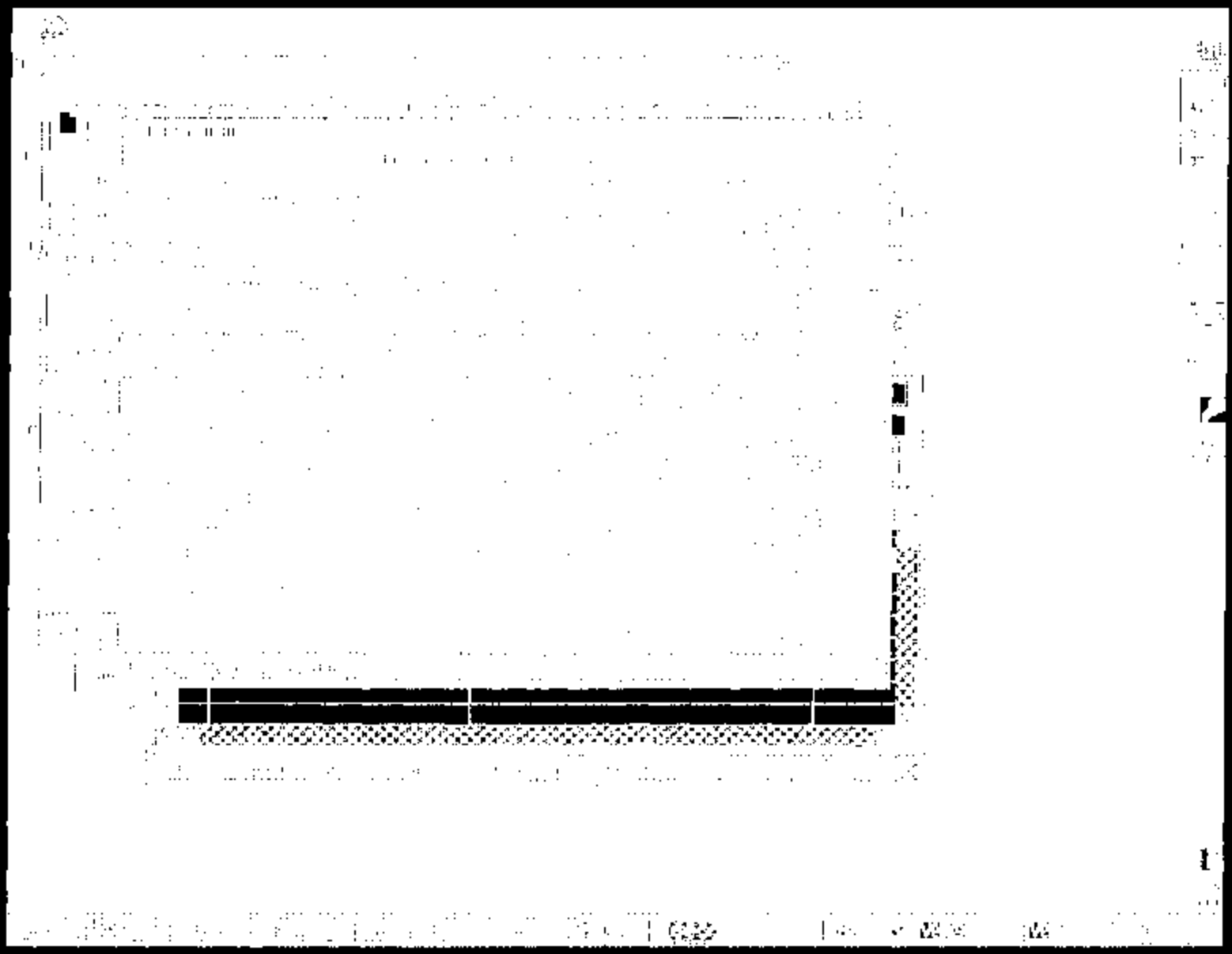


EA03-022

STRICK CORPORATION

1/29/04 LETTER TO ODI

RESPONSE TO REQUEST 9

Response to Request # 9

Produce all copies of Mobil's handling and storage recommendation for SHC 007 semi fluid grease which have been used, or are currently in effect. Further, produce all copies of Strick's handling and storage practices for Mobil's SHC 007 Semi-fluid grease. Provide any documentation that will verify that Strick followed these practices during subject vehicle production.

Records attached for Mobil's handling no records found for storage. Strick does not have written recommendations for handling and storage of Mobil's grease we followed there recommendations. Strick does store all grease inside the plant near the area where it is to be used. Strick does not have documentation that will verify Strick followed Mobil's handling and storage procedures during subject vehicle production.

INSTRUCTIONS FOR WHEEL END LUBRICATION

5-May-98

FROM	DATE	TYPE	FILL LEVEL	FILL AMOUNT	HUBCAP	SERVICE INTERVAL	COMMENT
MOBIL	4/8/96	MEMO	"TO THE SPINDLE"			200K TO 300K MILES	
MOBIL	8/1/97	TECHNICAL ADVICE	"EVEN WITH BOTTOM OF SPINDLE"		MAY BE NECESSARY TO FILL 1/3	INSPECT EVERY 100,000 MILES	SAYS PROBLEM CAUSED BY "DAM" FORMED BY OUTER BEARING SEAT MACHINED INTO HUB ON TN TYPE AXLES
MOBIL	5/17/97	TECH TOPIC, 3rd AD.	"ABOUT 20% FULL", BUT USED SUCCESSFULLY 10% TO 40% FULL	"REPORTEDLY . . 1-1/2 TO 2 PINTS"		200K TO 300 K IF SEVERE SERVICE OR RAIL	
MOBIL	?	?	"40 TO 60% OF THE CAVITY FULL . . . STATIC LEVEL TO BOTTOM OF SPINDLE"	"ABOUT 1 PINT WITH TN AXLE"		100K TO 200 K MILES	ALSO SAYS "REQUIRED MINIMUM (AT *LEAST* 8 OUNCES)"
MOBIL	12/8/94	TECH TOPIC	"20% FULL, BUT CAN BE USED SUCCESSFULLY AT FILL LEVELS OF 10% - 60%"	"REPORTEDLY . . 1-1/2 TO 2 PINTS"		ONLY IF LEAKAGE OBSERVED	
MOBIL	8/15/94	APPLICATION CONSIDERATIONS	"20% FULL . . . 10% TO 70% FULL HAVE WORKED SATISFACTORILY"	"NORMALLY REQUIRE ABOUT 1-1/2 TO 2 PINTS"	NO ADDITIONAL GREASE SHOULD BE PUT IN HUBCAPS	ONLY IF LEAKAGE OBSERVED	LEVEL JUST "ABOUT LEVEL WITH THE BOTTOM OF THE ROLLERS"
MOBIL	1/14/94	TECH TOPIC	"50% FULL . . . CAN BE USED SUCCESSFULLY AT FILL LEVELS OF 45% - 70%"				
MERITOR	4/23/98	PRELIMINARY	"FILL CAVITY 1/3 FULL . . "	"APPROXIMATELY 1.5 POUNDS OF GREASE"	NO ADDITIONAL GREASE IN HUBCAPS		
ROCKWELL	JULY, 1998	MAINTENANCE MANUAL				1 YEAR OR 100,000 MILES	APPLY TO SYNTHETIC?

4/98 – Memo sent to all Mobil Pers

To: Jeffrey T Zudock/Fairfax/Mobil-Notes@Mobil, Robert S Berlin/Fairfax/Mobil-Notes@Mobil, Manuel A Garcia/Fairfax/Mobil-Notes@Mobil, Dan G Holdmeyer/Fairfax/Mobil-Notes@Mobil, Richard E Moss/Fairfax/Mobil-Notes@Mobil, Douglas W Pierce/Fairfax/Mobil-Notes@Mobil, Michael L Paulsen/Fairfax/Mobil-Notes@Mobil, Robert E Shorter/Fairfax/Mobil-Notes@Mobil, Douglas T Towns/Fairfax/Mobil-Notes@Mobil, Alex F Taylor/Fairfax/Mobil-Notes@Mobil, Gary L Wellingford/Fairfax/Mobil-Notes@Mobil, Irma Garcia/Fairfax/Mobil-Notes@Mobil, J L Burkett/Fairfax/Mobil-Notes@Mobil, Wayland Walker/Fairfax/Mobil-Notes@Mobil, Larry L Reutzel/Fairfax/Mobil-Notes@Mobil, Russ C Griffith/Fairfax/Mobil-Notes@Mobil, Henry R Rozzoni/Fairfax/Mobil-Notes@Mobil, Ray J Salazar/Fairfax/Mobil-Notes@Mobil, Bill Jones/Fairfax/Mobil-Notes@Mobil, Haven B Rolander/Fairfax/Mobil-Notes@Mobil, Nick Stephens/Fairfax/Mobil-Notes@Mobil, Greg S Engel/Fairfax/Mobil-Notes@Mobil, Jocelyn E Cuff/Fairfax/Mobil-Notes@Mobil, James R Erickson/Fairfax/Mobil-Notes@Mobil, Byron S Snowden/Fairfax/Mobil-Notes@Mobil, Mike E Martin/Fairfax/Mobil-Notes@Mobil, David S Tsurusaki/Fairfax/Mobil-Notes@Mobil, Brad L Prickett/Fairfax/Mobil-Notes@Mobil, Donald J Stone/Fairfax/Mobil-Notes@Mobil, Matthew J Sunell/Fairfax/Mobil-Notes@Mobil, Richard A Larson/Fairfax/Mobil-Notes@Mobil, Yvette K Trzcinski/Fairfax/Mobil-Notes@Mobil, Eva M Vincent/Fairfax/Mobil-Notes@Mobil, Geoffrey R Polanek/Fairfax/Mobil-Notes@Mobil

cc:

Subject: Mobilth SHC 007 - Application Alert

Some good info from Dick Morrow.

Ted

---------- Forwarded by Ted A Ziegler/Dallas/Mobil-Notes on 04/10/98 02:52 PM ----------

Richard C Morrow
04/09/98 09:02 AM

To: David K Scheetz/MidWest/Mobil-Notes@Mobil, Dan R Kellen/WestCoast/Mobil-Notes@Mobil, Ted A Ziegler/Dallas/Mobil-Notes@Mobil, Rob F Peterson/Fairfax/Mobil-Notes@Mobil, Don M Pirro/Fairfax/Mobil-Notes@Mobil

cc: Bill Buck/Fairfax/Mobil-Notes@Mobil, Paul A Dombkowski/Fairfax/Mobil-Notes@Mobil

Subject: Mobilth SHC 007 - Application Alert

We have had a lot of problems lately with certain types of axles using 007. These are the "TN" type where the outer bearing is smaller than the inner bearing. In all cases the outer bearing became starved for grease and a fire resulted, sometime burning up the trailers. (ask Dan, he has had experience with an account that had two trailers burn up recently)

The problem is that NOT ENOUGH GREASE IS INSTALLED IN THE HUBS. These hubs should have the bearings packed and a additional 1-2 pints (depending on the size of the hub) installed between the bearings. The fill level on the hub should be at least to the spindle.

It isn't easy, but a gear oil pump (available from Granger for $35) works very well on a 35 lb. pail. Install the packed inner bearing and seal, mount the wheel on the spindle and before the outer bearing is installed, pump in the necessary amount of grease. Then install the packed outer bearing.

If enough grease is initially installed, there should be no problems. We recommend checking for leaks at regular service intervals and visually checking outer bearings at 200K-300K intervals to insure they are getting enough grease.

Don't over torque the nuts. The first nut should be torqued to 100-200 ft lbs. to seat the components, then relaxed and retorqued to 50 ft-lbs then backed-off about 1/2 flat. This should result in an end play of .001-.005 inches, which should be checked with a dial indicator.

Recommend to y our customers to use the published TMC method of adjusting bearings. Bearing adjusted too loose will result in a little shorter bearing life. bearings installed too tight will fail within a short time.

Some bearing suppliers will recommend a .001 preload, but as there is no way to measure this. We endorse the .001-.005 end play method.

If you get involved in bearing failures, check all wheel ends on the trailer with the failure and randomly check as many others as you can.

I would appreciate any feedback or comments.

8/97

TECHNICAL PRODUCT APPLICATION ADVICE

Mobilith SHC 007
As used in Rockwell (and other similar design) TN Model Axles

In field service there have been some service problems noted in wheel hub designs where the outer bearing is smaller than the inner bearing. This generally applies to some trailer wheel hubs (notably Rockwell TN Series), some Eaton axles, and some steer axle hubs.

The problem is that in some designs there is a "dam" formed by the outer bearing seat machined into the hub. If there is insufficient lube in the hub, either oil or semi-fluid grease, the "dam" can cause starvation and eventually failure of the outer bearing.

The fill level in the hub is recommended to be even with the bottom of the spindle to insure adequate lubrication. It may also be necessary to keep the hubcap 1/3 full also. This requires making sure that there is adequate ventilation provided by the hubcap or a vent hole drilled in the end of the axle. (The vent hole drilled in the end of the axle is standard on Rockwell units, but will not work on solid spindles)

It is also recommended that these units be inspected by either removing the hubcap or using the inspection hole on a periodic basis of about 100,000 miles. The purpose of the inspection is just to insure that there is evidence that the outer bearing is getting grease. There is no need to do any additional service, unless the outer bearing is dry.

For questions or further clarification of this subject, please contact the Mobil Customer Response center at 1-800-662-4524

R. C. Morrow
Applications Engineer

6/97

Mobil Tech Topic, 3rd Edition

Lubrication of Wheel-End Bearing Systems and Steering Gears with Mobilith SHC 007 Semi-Fluid Grease

Applications

Mobilith SHC 007 semi-fluid grease can be used as a wheel bearing replacement or initial fill lubricant in all makes and models wheel-end systems designed to use oil, except drive axles, including steer axles. It can also be used in all current systems designed to use grease. It is also suitable for use in any slow speed auxiliary gear systems designed for oil or grease such as steering gears or trailer landing gears. (See product installation recommendations.)

This premium quality synthetic semi-fluid grease has proven itself an excellent cost saving recommendation as a wheel bearing and gear lubricant. It is suitable for use in all on- and off-road mobile equipment having seals in reasonably good condition.

Production Description

Mobilith SHC 007 is a "semi-fluid" grease made from a premium quality synthetic base oil and a high temperature lithium complex thickener. The oil is a high-load capacity ISO 460 and is fortified with the proper extreme pressure, antiwear, tackiness, and other quality additives for superior long-term performance and corrosion protection.

Advantages of Mobilith SHC 007

- Elimination of wheel seal and gear case leakage
- Suitable for extreme cold temperatures
- Suitable for extreme high temperatures
- Exceptionally long service life
- Greatly extended service intervals
- Exceptional bearing life
- Exceptional seal life
- Compatible with all synthetic and mineral gear oils
- Compatible with all lithium greases.

Benefits of Mobilith SHC 007

- Significant savings in maintenance service costs
- Elimination of oil contaminated brake shoes
- Significant saving in parts replacement costs

Product Installation Recommendations

Application and Design Considerations Mobilith SHC 007

This semi-fluid grease can easily be pumped with any system designed for grease or gear oil. It flows well into interior cavities of wheel-ends and gear boxes.

Wheel-end systems should be filled about 20% full, but can be used successfully at fill levels of 10% - 40%.

Venting must be added to systems not specifically designed for semi-fluid grease. Venting can be as simple as a 1/16 inch diameter hole drilled in the center of the wheel hubcap or axle shaft end. There are specially designed hubcaps available from most hubcap manufacturers incorporating the proper vent, but special hubcaps are not required as long as adequate venting is provided.

Wheel bearings can be prepacked using a pressure bearing grease packing fixture prior to installation if desired.

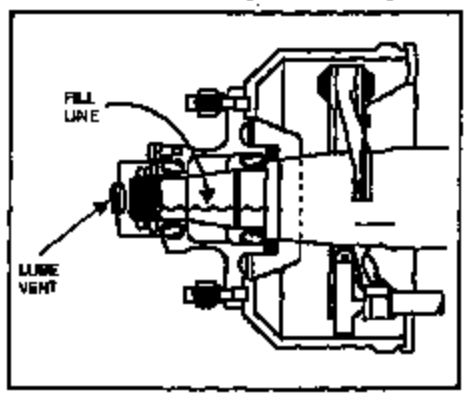
Wheel-end Systems

Initial installation should include cleaning and inspecting all bearings, cups, cones, seals and fasteners. Seals and any questionable parts should be replaced and special attention should be given to proper installation. High mileage or old seals should be replaced regardless of their apparent condition as it will be a long time before any additional service will be required. Vents should be clean and grease free.

The Mobilith SHC 007 need only be changed if it becomes contaminated with dirt (grease will be gritty) or water (grease will look milky). Dark discoloration is normal with extended service. As long as the consistency is sloppy or runny the product is suitable for continued service.

Gear Lubrication

Mobilith SHC 007 is an excellent replacement lubricant for many gear boxes, including trailor landing gears and manual steering. Simply drain the old lubricant as you normally



Typical wheel-end assembly. Fill to line shown with Mobilith SHC 007.

would and pump in the Mobilith SHC 007. Check for leaks and fill as necessary during normal PMs and replace only if contaminated with dirt or water.

Maintenance and Application Notes, Mobilith SHC 007

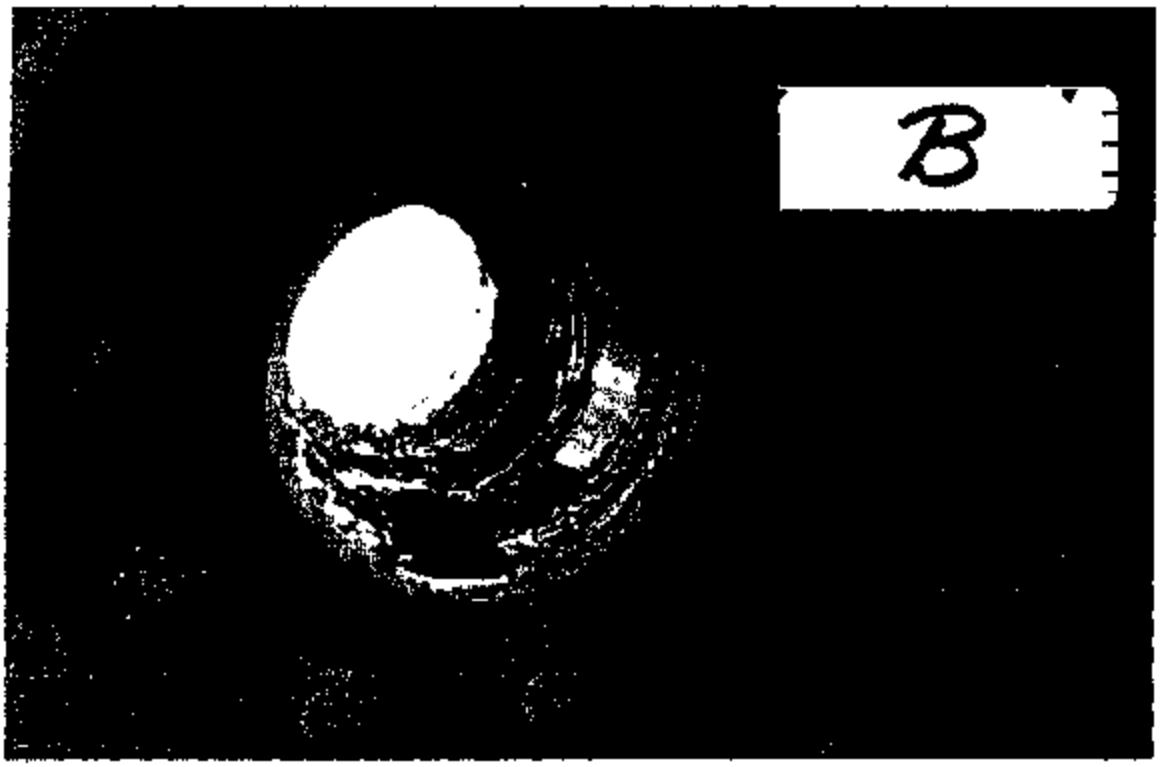
- Overfilling wheel-ends or gearboxes with Mobilith SHC 007 (or any other gear oil or grease) will cause leaks.
- A reportedly easy way to assemble the units is to use a hand operated grease pump with a probe to pump 1 1/2-2 pints of grease into the hub center before the outer bearing is installed. Then install the hubcap.
- In very cold temperatures below 0° C, bearing should be prepacked with a pressure packer or soaked for 15 minutes in a container of Mobilith SHC 007 at room temperature.
- Lightly coat all parts, especially seals, with Mobilith SHC 007 prior to installation. It makes installation easier, prevents corrosion, and helps avoid installation damaged seals.
- Follow all manufacturer's recommendations concerning proper installation of seals and bearings especially close, as intervals between services and inspections are greatly extended.
- Service need only be performed if leakage is evident upon inspection.
- Mobilith SHC 007 is not recommended for drive axle wheel bearings intended to be lubricated from the differential lube system.
- Mobilith SHC 007 is recommended as a transmission or differential lube in cases where a leaky unit is not deemed worth the effort or expense to repair and is used for low speed low mileage applications such as a yard tractor or a crane.
- Although Mobilube SHC 007 is compatible with mineral and synthetic gear and transmission lubes and most greases, remove as much of the old lubricant as possible when making changes. The more of the old lube contaminating the Mobilith SHC 007, the more long-term service life and lubrication protection will be affected.
- Save all prematurely failed parts and lube samples for examination and analysis by suppliers to help prevent failure reoccurrances.
- All steer axles and trailer axles subjected to severe service (and rail hauled trailers) should be checked for looseness or excessive end play at 200-300,000 miles. If more than 10 mils axial end play is measured or suspected, remove hubcap and readjust wheel nut(s). Grease will appear dark, but don't relubricate unless gritty dirt or water is evident. Reassemble with a new hubcap gasket and add new grease as required.

For additional technical information call 1-800-662-4525.

Mobil Oil Corporation
TECHNICAL PUBLICATIONS
3225 GALLOWS ROAD, FAIRFAX, VIRGINIA 22037-0001

Lubrication of Wheel-End Bearing Systems and Steering Gears with Mobilith SHC 007 Semi-Fluid Grease
TT I-19 6497056 (08-17-97)

Hand packing a wheel bearing with Mobilith SHC 007.



After five years of service, Mobilith SHC 007 is still fluid and, even though dark colored, suitable for continued service.

WHEEL-END LUBRICATION

For Wheel-Ends Using Mobilith SHC 007 Synthetic Semi-Fluid Grease

SCOPE:

These instructions are intended for use with trailer wheel-ends and truck steer axle wheel bearings.

These wheel-end systems are devided into two types. They are:

1. both inner and outer bearings are the same size
2. the inner bearing is larger than the outer bearing.

Type 2 with the smaller outer bearing is by far the most critical. In this type it is possible to have some lube present in the hub, but not enough to lubricate the outer bearing. This will result in failures and subsequent damage.

INSTALLATION PROCEDURE:

We recommend using a gear oil pump of the type that is commonly mounted on a 35# pail or 120# keg and designed to pump gear oil. (These are readily available from Grainger Equipment Supply)

The objective is to end up with a system that has a maximum of 50% of the wheel hub cavity filled with grease, all internal parts with a very light coating of grease, the bearings packed with grease and an unrestricted vented hubcap or seals that is not plugged with grease or other material.

Type 1 wheel-ends will work well with the hub about 30% full while the type 2 (with smaller outer bearing) must have 40-50% of the cavity full and should have a static lube level up to the bottom of the spindle..

Larger hubs will require 1 1/2 to 2 pints of lube while the smaller "TN" type will require about 1 pint.

The recommended procedure is detailed in a video available from Mobil and is reviewed below.

Use new seals and bearings in excellent condition as it will be a long time before the next service.

Either soak the bearings covered with warm (room temperature) Mobilith SHC 007 or preferably pressure pack them prior to installation.

Coat all internal surfaces, seals, nuts etc. with a light coating of grease for corrosion protection purposes and to ease assembly.

Install the inner prepacked bearing and inner seal. Mount the hub on the spindle and pump the required minimum (at least 8 ounces) into the hub using the gear oil pump.

Install the prepacked outer bearing, and adjust the bearings to allow .001 to .005 inches of endplay according to the TMC published procedure.

Install the hubcap making sure that the vent is free of grease and unobstructed.

PM Service

During routine PM service inspect the inner side of the hub for obvious leakage. (If leakage is occurring it will be because the venting is inadequate or the hub was filled more than 80% full) Correct leakage problems.

We recommend some type of follow-up inspection between 100k and 200k miles, to insure the outer bearing is getting lubricated and that there is enough grease in the hub. This is especially important with the wheel-end systems using the small outer bearing. A visual inspection through the inspection plug or after removing the hubcap should be sufficient. If inadequate grease is suspected, pull the outer bearing to make sure of an adequate amount of grease. Replenish if necessary.

On trailers that are hauled on railcars we, also, recommend an end play check at 250k-300k miles because of the tendency of these wheel- ends to develop higher clearances. The constant vibrations from the rail cars will eventually wear flat spots on the bearing rollers.

TECHNICAL SUPPORT

For questions or problems please contact the Mobil Customer Response Center at 1-800 662 4525.

R. C. Morrow

R. C. Morrow
Applications Engineer
Automotive Products
Mobil Oil

Mobil
Tech Topic

Lubrication of Wheel-End Bearing Systems and Steering Gear with Mobilith SHC 007 Semi-Fluid Grease

Applications

Mobilith SHC 007 semi-fluid grease can be used as a wheel bearing replacement or initial fill lubricant in all makes and models wheel end systems designed to use oil, except drive axles. It can also be used in all current systems designed to use grease. It is suitable for use in any slow speed auxiliary gear systems designed for oil or grease such as steering gears or trailer landing gears (See product installation recommendations.)

This premium quality synthetic semi-fluid grease has proven itself an excellent cost saving recommendation as a wheel bearing and steering gear lubricant. It is suitable for use in all on- and off-road mobile equipment having seals in reasonably good condition.

Production Description

Mobilith SHC 007 is a "semi-fluid" grease made from a top quality synthetic base oil and a high temperature lithium complex thickener. The oil is a high-load capacity ISO 460 and is fortified with the proper extreme pressure, antiwear, tackiness and other quality additives for superior long-term performance.

Advantages of Mobilith SHC 007

- Elimination of wheel seal and gear case leakage
- Suitable for extreme cold temperatures
- Suitable for extreme high temperatures
- Exceptionally long service life
- Greatly extended service intervals
- Exceptional bearing life
- Exceptional seal life
- Compatible with all synthetic and mineral gear oils
- Compatible with all lithium greases.

Benefits of Mobilith SHC 007

- Significant savings in maintenance service costs
- Elimination of oil contaminated brake shoes
- Significant saving in parts replacement costs

Product Installation Recommendations

Application and Design Considerations

Mobilith SHC 007

This semifluid grease can easily be pumped with any system designed for grease or gear oil. It flows well into interior cavities of wheel ends and gear boxes.

Wheel end systems should be filled about 20% full, but can be used successfully at fill levels of 10% - 60%.

Venting should be added to systems not specifically designed for semi-fluid grease. Venting can be as simple as a 1/16 inch diameter hole drilled in the center of the wheel hub and fill plugs can be a standard 1/8 NPT pipe plug. There are specially designed hubs available from most hub manufacturers incorporating the proper vent.

Installation is easier if oil system hub covers with fill plugs are used, or if a plug or grease fitting is installed in units not originally equipped.

Unlike oil lubrication systems, wheel bearings should be prepacked using a pressure bearing grease packing fixture prior to installation.

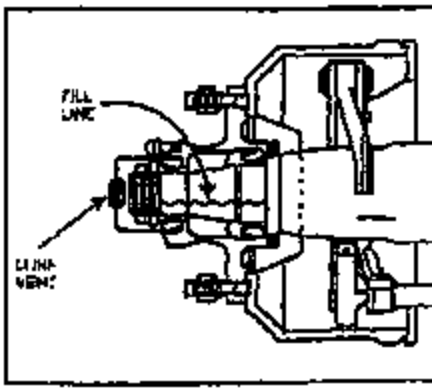
Wheel End Systems

Initial installation should include cleaning and inspecting all bearings cups, cones, seals and fasteners. Seals and any questionable parts should be replaced and special attention should be given to proper installation. High mileage or old seals should be replaced regardless of their apparent condition as it will be a long time before any additional service will be required.

The Mobilith SHC 007 need only be changed if it becomes contaminated with dirt (grease will be gritty) or water (grease will look milky). Dark discoloration is normal with extended service. As long as the consistency sloppy or runny the product is suitable for continued service.

Steering Gears

Mobilith SHC 007 is an excellent replacement lubricant for steering



Typical wheel-end assembly. Fill to line shown with Mobilith SHC 007.

MOBILITH SHC 007 SEMI-FLUID, SYNTHETIC GREASE TRAILER WHEEL BEARING INSTALLATION PROCEDURE

Developed and used by:

Duthler Truck Center, Inc.
4525 Clay SW
Grand Rapids, MI 49548
Phil Van Wiltenburg,
(616) 531-9150

TNT-Holland Motor Express
4600 Clyde Park Ave. SW
Grand Rapids, MI 49509
Ron Wiebenga, Service Manager
(616) 538-9508

1. During a scheduled brake service, perform conversion from conventional gear oil lubrication to synthetic grease lubrication.

2. Completely drain and disassemble each trailer wheel hub. Remove tires, caps, seals, bearings, etc.

3. Drill 21/64" hole through the wheel hub, centered between the bearing housings. Tap the hole with a conventional thread tap 1/8-27 NPT.

4. Thoroughly steam clean the housing to remove all contaminants.

5. Reassemble the entire housing using new wheel seals. Replace the conventional oil cap with a sintered metal cap. This solid cap will prevent contaminants from entering the housing and prohibits grease LEAKAGE (provided it's installed properly).

6. Utilize a grease pump with needle probe to fill each wheel hub with 1.5 lbs of Mobilith SHC 007 synthetic grease. Filling through the open hole (previously drilled) will allow the cavity to "breathe" and prevent seal damage. Also, it will ensure the grease level is equalized between inner and outer bearings.

   NOTE: To accurately measure the fill rate from your grease pump, use a clean container and scale to pre-determine the number of "cycles" needed to obtain 1.5 lbs of grease.

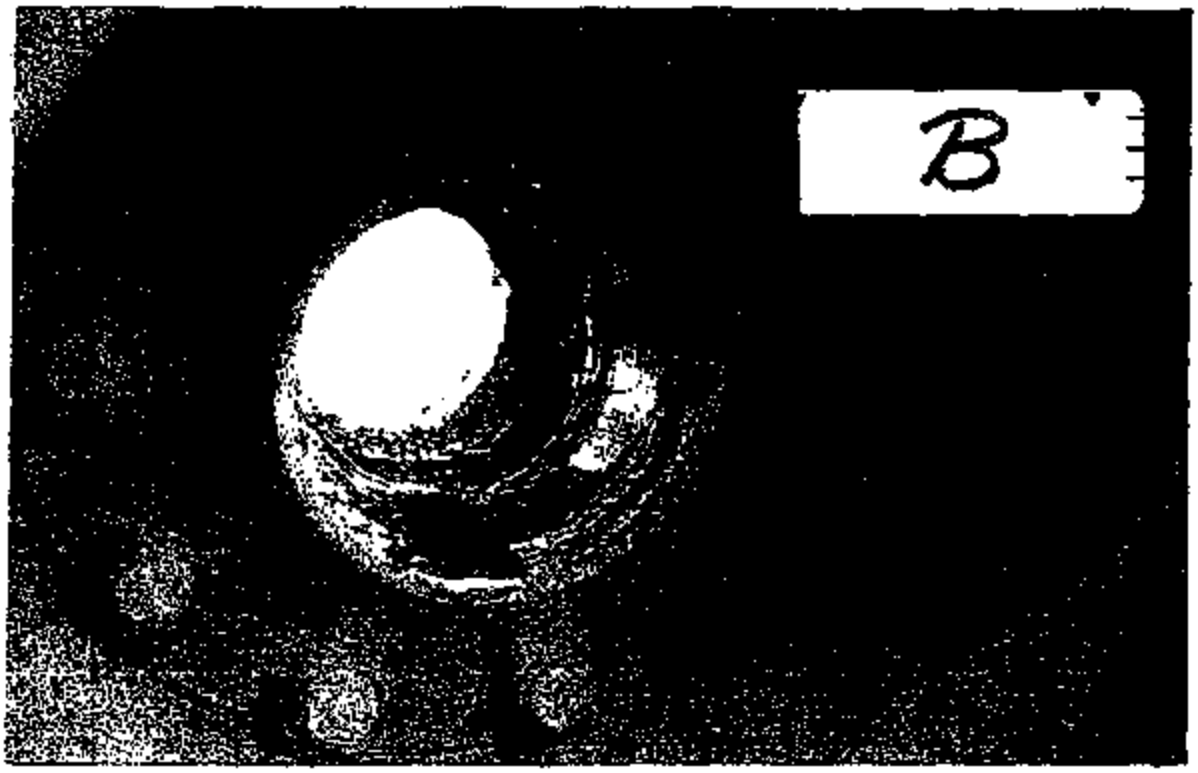
7. Install a 1/8" countersunk hex head pipe plug to seal the cavity (be sure to use teflon tape on the threads).

8. YOU ARE READY TO GO UNTIL THE NEXT BRAKE SERVICE OR THE LIFE OF THE TRAILER (WITH HUB-PILOTED SYSTEM).

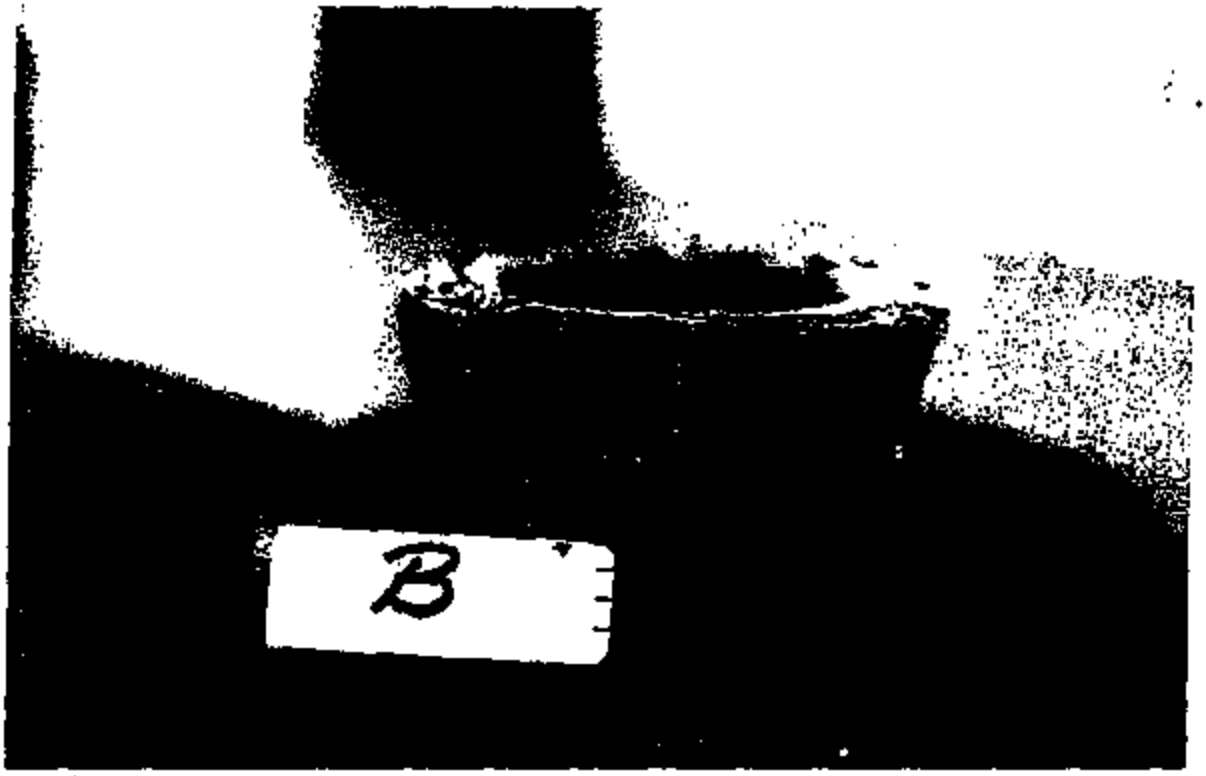
9. Be certain to monitor the wheel hubs for leakage (there should be NONE). The distinctive RED grease will be clearly evident. If a cap comes loose or a hub is damaged, be certain to service the vehicle immediately.

PHOTOGRAPHIC DOCUMENTATION

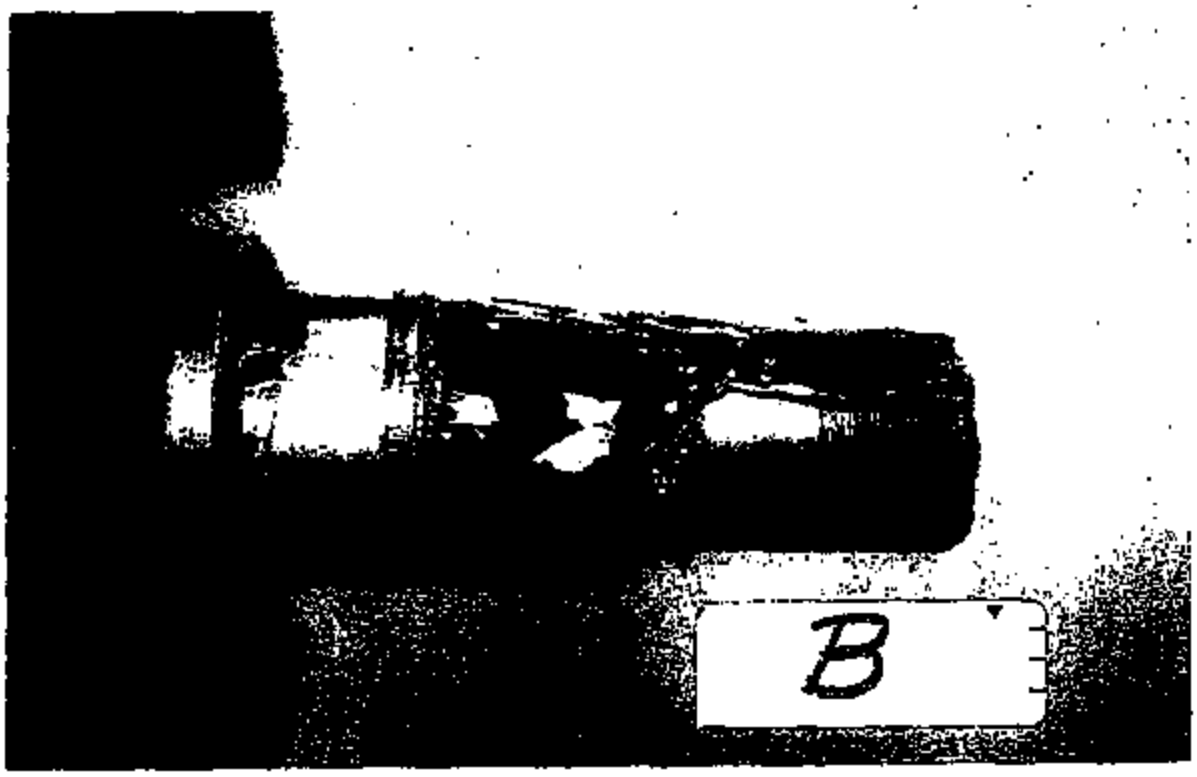
Hand packing a wheel bearing with Mobilith SHC 007.



After five years of service, Mobilith SHC 007 is still fluid and, even though dark colored, suitable for continued service.



The outer bearing is well lubricated after five years' service with Mobilith SHC 007.



After five years' service Mobilith SHC 007 is still fluid and in good condition.

gears. Simply drain the old lubricant as you normally would and pump in the Mobilith SHC 007. Check for leaks and fill as necessary during normal PM's and replace only if contaminated with dirt or water.

Maintenance and Application Notes, Mobilith SHC 007

- Overfilling wheel ends or gearboxes with Mobilith SHC 007 (or any other gear oil or grease) will cause leaks.
- Hub caps should have only a 5/8 inch "collar". No additional grease should be put into hubcaps. The vent should not be covered.
- A reportedly easy way to assemble the units is to use a pressure packer to prepack the bearings, use a hand operated grease pump with a probe to pump 1 1/2-2 pints of grease into the hub center before the outer bearing is installed. Then install the hubcap after lightly coating the inside of the hubcap and putting a 5/8 inch collar around the outer circumference (inside) of the hubcap.
- Liberally coat all parts, especially seals, with Mobilith SHC 007 prior to installation. It makes installation easier, prevents corrosion, and helps avoid installation damaged seals.
- Follow all manufacturer's recommendations concerning proper installation of seals and bearings especially close, as intervals between services and inspections are greatly extended.
- Service need only be performed if leakage is evident upon inspection.
- Mobilith SHC 007 is not recommended for drive axle wheel bearings intended to be lubricated from the differential lube system.
- Mobilith SHC 007 is not recommended as a transmission or differential lube, except in cases where a leaky unit is not deemed worth the effort or expense to repair and is used for low speed low mileage applications such as a yard tractor or a crane.
- Although Mobilube SHC 007 is compatible with mineral and synthetic gear and transmission lubes and most greases, remove as much of the old lubricant as possible when making changes. The more of the old lube contaminating the Mobilith SHC 007, the more long-term service life and lubrication protection will be affected.
- Save all prematurely failed parts and lube samples for examination and analysis by suppliers to help prevent failure reoccurrances.

Attached for informational purposes are the recommendations of a major manufacturer of wheel end seals and hubcaps. For additional technical information call 1-800-662-4525.

Mobil Oil Corporation
TECHNICAL PUBLICATIONS
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Mobil Oil Corporation

3225 GALLOWS ROAD
FAIRFAX, VIRGINIA 22037-0001

August 15, 1994

Mobil Marketers and Customers

Mobilith SHC 007
APPLICATION CONSIDERATIONS

Please refer to the previously published Mobil Tech Topic, "Lubrication of Wheel-End Bearing Systems and Steering Gears with Mobilith SHC 007 Semi-Fluid Grease" (TT 1-19).

Because of recent field experience and parts suppliers comments, below are shown some updated recommendations.

The optimum fill level is 20% full. This will provide a level of just at about the level of the bottom rollers, just about the same level as if fluid lube was used. This will normally require that about 1 1/2 - 2 pints of Mobilith SHC 007 be added during assembly. (Levels of 10%-70% full have worked satisfactory).

All parts should be lightly coated with grease to prevent corrosion from condensation.

Hub caps should have only a 5/8 inch "collar". No additional grease should be put into hubcaps. The vent should not be covered.

A reportedly easy way to assemble the units is to use a pressure packer to prepack the bearings, use a hand operated grease pump with a probe to pump 1 1/2 -2 pints of grease into the hub center before the outer bearing is installed. Then install the hubcap after lightly coating the inside of the hubcap and putting a 5/8 inch collar around the outer circumference (inside) of the hubcap.

Service need only be performed if leakage is evident upon inspection.

Questions, performance comments (good or bad), or suggestions should be directed to Bill Pratt at 1-800-662-4525 prompt #7.

R. C. (Dick) Morrow
Applications Engineer

Mobil Tech Topic

Lubrication of Wheel-End Bearing Systems and Steering Gears with Mobilith SHC 007 Semi-Fluid Grease

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Application and Design Considerations

Mobilith SHC 007

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Wheel end systems should be filled about 50% full, but can be used successfully at fill levels of 45% - 70%.

Venting and fill plugs should be added to systems not specifically designed for semi-fluid grease. Venting can be as simple as a 1/8 inch diameter hole drilled in the center of the wheel hub and fill plugs can be a standard 1/8 NPT pipe plug. There are specially designed hubs available from most hub manufacturers incorporating the proper vent.

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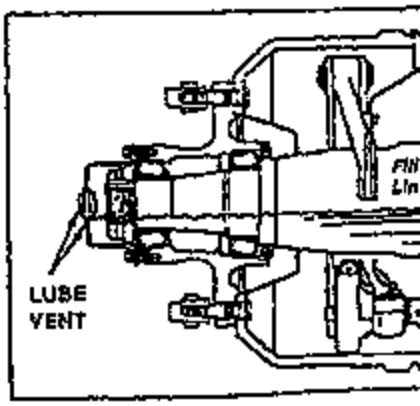

Typical wheel-end assembly. Fill to line shown with Mobilith SHC 007.

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MERITOR.

7. Guidance for lubricating a wheel-end with approved NLGI 00 grease (Table N) is as follows:

   a. Note that detailed guidance for installing components such as seals, bearings and hubs is located in the "Assembly" section of this manual.

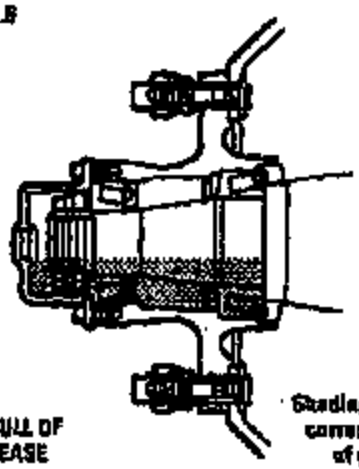
   b. Pack bearing cones with grease by forcing grease into the cavities between rollers and cage from the large end of cone. The use of a pressure packer is recommended, otherwise, pack the bearings by hand.

⚠ CAUTION

It is important not to overfill wheel-end cavity with lubricant. Do not exceed grease level indicated below. Also, make sure excess grease is wiped away since it can contaminate brake linings and cause poor brake performance.

   c. Fill cavity approximately 1/3 full with grease (from the 4 to the 8 o'clock positions). This will involve installation of approximately 1.5 pounds of grease. Note, however, that different hub designs may require that either more or less grease be installed. Figure 14.8.

Figure 14.8



   d. Do not install any grease in hub cap.

   e. Apply a light coat of grease to the axle wheel retention nuts to indicate what lubricant is installed as well as help prevent corrosion of these parts.

   f. Meritor recommends that vented hub caps be used whenever synthetic or semi-synthetic NLGI 00 grease is used.

Table N

WHEEL-END GREASE SPECIFICATIONS					
COMPONENT	GREASE	MERITOR SPECIFICATION	NLGI GRADE	GREASE CLASSIFICATION	OUTSIDE TEMPERATURE
TRAILER AXLE WHEEL END	Multi-Purpose Grease	0-617-A or -B	1 or 2	Lithium 12-Hydroxy Stearate or Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.
	Trailer Axle Bearing	0-547	00	Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.

Section 5 Lubrication

Rockwell 7-95

Grease-Lubricated Wheel Ends

1. The most common greases used in Rockwell trailer axle wheel ends have a designation of NLGI (National Lubricating Grease Institute) grade 1 or 2. See **Figure 167.**

2. Refer to the specifications of the grease manufacturer for temperature service limits.

3. Grease recommendations are based on commercial products that have given satisfactory results under normal conditions. There are, however, many proprietary grease products on the market that will perform satisfactorily and may be preferable because of supply problems or common usage with other vehicle components. Where such products are recommended by reputable suppliers for the specific lubrication of our components, Rockwell has no objections, provided that these substitute products are equal to or better than the Rockwell recommendations in regard to lubrication properties, water resistance, corrosion protection, high and low temperature characteristics, oxidation stability, shear stability, etc. All substitute products are subject to Rockwell approval.

4. Contaminated lubricant can quickly wear internal wheel components. It is therefore essential that clean lubricants be installed into the wheel-end on a periodic basis which is appropriate to the application in which the axle is to be operated.

5. The frequency of grease changes depends on operating conditions, speeds, and loads. The following information is intended as a general guideline. Certain applications, such as container chassis and trailer on flat car service, put limited mileage on axles, allowing maintenance intervals to be extended. Other applications put severe stress on the wheel-end lubricant, requiring maintenance intervals to be reduced.

   A. **General** — The grease should be changed whenever it is contaminated or when the wheel-end enclosure is disturbed by the removal of the spoke wheel or hub.

   B. **Standard-Duty Service** — For standard duty on-highway service in which 100,000 miles a year is accumulated, change grease every 100,000 miles. For service in which less than 100,000 miles is accumulated, change grease every 12 months.

   C. **Heavy-Duty Service** — For heavy duty on-highway, off-highway or combined on/off-highway service in which more than 60,000 miles a year is accumulated, change grease every 30,000 miles. For service in which less than 60,000 miles a year is accumulated, change grease every 6 months.

WARNING

Do NOT use gasoline to clean parts. Gasoline can explode or burn and cause serious personal injury.

6. To remove grease from a wheel-end, clean the old grease from the spoke wheel or hub, the bearing cones, and hub cap with a stiff fiber (not steel) brush and kerosene or diesel fuel oil (not gasoline). Allow the cleaned parts to dry, then wipe the solvent residue away with a clean absorbent cloth since solvent residue may dilute the grease or prevent it from properly adhering to wheel-end component surfaces.

7. See the "Install Wheel-End Components" section of this manual, page 15 for procedures to grease trailer axle wheel ends.

Figure 167 — TRAILER AXLE GREASING INTERVALS AND SPECIFICATIONS

Greasing Interval①	Grease	Rockwell Specification	NLGI Grade	Grease Classification	Outside Temperature
General Service: Grease the bearings if the wheel end is disturbed during wheel or hub removal or if the grease is contaminated. **Standard-Duty Service:** For 100,000 miles (160,000 km) or more a year, grease the bearings every 100,000 miles (160,000 km). For less than 100,000 miles (160,000 km) a year, grease the bearings once a year. **Heavy-Duty Service:** For 60,000 miles (96,000 km) or more a year, grease the bearings every 30,000 miles. For less than 60,000 miles a year, grease the bearings every 6 months.	Multi-Purpose Grease	O-617-A or -B	1 or 2	Lithium 12-Hydroxy Stearate or Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.
	Trailer Axle Bearing	O-847	00	Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.

NOTES:

① The recommended greasing interval is based on operating conditions, speeds and loads. Limited service applications may allow the recommended interval to be increased. Severe service applications may require the recommended interval to be reduced. For more information, contact a Rockwell service representative.

EA03-022

STRICK CORPORATION

1/29/04 LETTER TO ODI

RESPONSE TO REQUEST 10

Response to Request # 10

Provide contact information for the following personnel from the plant(s) where the subject vehicles were built. Include name, title, length of service, a brief job description and a direct dial phone number of:

a-Manufacturing Plant Manager;

Steve Burns
Director of Operations
24 years of service
Directs all operation of the plant.
260-692-6147 ext. 3121

b-Engineering Manager;

Jim Jackson
Engineering Manager
15 years of service
Leads and directs 3 other engineers in specification drawings
260-692-6147 ext. 3134

c-Purchasing Manager(s) who handle purchases of wheel-end grease; and

Mike Augsburger
Materials Purchasing Manager
22 years of service
Directs 3 purchasing personnel and provides just in time material for production.
260-692-6147 ext. 3158

d-Materials handling Manager(s) who oversees wheel-end grease.

Dave Perks
Shipping and Receiving Manager
20 years of service
Directs the receiving and shipping of materials
260-692-6147 ext. 3146

EA03-022

STRICK CORPORATION

1/29/04 LETTER TO ODI

RESPONSE TO REQUEST 11

Response To Request # 11

Produce copies of all documents transmitted, by any method, between Strick and any wheel-end component supplier, and any wheel-end grease supplier that relate to, or may relate to the alleged defect. Organize the document(s) chronologically by date of receipt.

See attached

Mobil Oil Corporation

[illegible]
DALLAS, TEXAS [illegible]

February 11, 1994

Leon Lovett
Stemco Products
PO Box 1989
Longview, TX 75602

Dear Mr. Lovett:

Regarding the proper quantity of Mobilith SHC 007 semi-fluid grease to use when filling wheel end assemblies:

1. Dip each bearing into the grease at room temperature and assemble.

2. Fill the housing not more than 1/3 full with grease.

3. The hub cap may be assembled dry to minimize the effect of grease interfering with the vent system on the center of the cap face. The problem of grease slump-out during assembly of the cap is also thereby avoided, without compromising the lubrication of the bearing system.

Many wheel end applications have been operated with half the amount of semi-fluid grease as compared to oil with very satisfactory results. The above filling procedure should provide optimum bearing and seal life for STEMCO wheel end systems when used in conjunction with Mobilith SHC 007 semi-fluid grease.

Sincerely,

Clark A. Kibler

Clark A. Kibler
Staff Engineer
Equipment Builder Department

cc: B. [illegible], STEMCO

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1
To Eddie Prince | From John Mattson
Co. | Co.
Dept. | Phone #
Fax # | Fax #

Mobil Oil Corporation

3225 GALLOWS ROAD
FAIRFAX, VIRGINIA 22037-0001

April 26, 1994

Mr. Charles E. Reagan
47690 East Anchor Court
Plymouth, MI 48170

Dear Mr. Reagan:

Confirming our discussion, below is listed a recommended procedure for converting wheel bearing lubrication from oil to Mobilith SHC 007 semi-fluid grease. This procedure is presently followed by established users of 007 such as Carolina Freight and Old Dominion Truck Lines and has proven quite satisfactory.

The installation procedure is as follows:

1. Drain the trailer wheel hub oil.

2. Thoroughly clean the wheel hub and old bearings if being reused upon inspection.

3. Recommend installation using new grease seals.

4. Fill the hub cavity with 007 anywhere from 1/2 to full level (Bottom part of hub is what you are filling).

5. Pack the bearings with a standard hand operated grease wheel bearing packer. Install bearings and grease seals in accordance to axle manufacturers recommendations. You may want to apply a small amount of Mobilith on the spindle as well as the seal lip where it touches the wear ring. Upon completion of bearing and seal installation tighten retainer nuts per manufacturers recommendations.

6. Fill the vented hubcap approximately 1/4 to 1/3 full of 007 grease. Some fleets vary the amount but none ever fill more than 1/3 of hubcap capacity.

7. A vented cap is recommended which helps reduce pressure and heat buildup on wheel end assembly.

I trust this provides the information needed. If there are any questions however, please call me at 1-800-227-0707, extension 1319.

Very truly yours,

R. E. Stevens
National Account Manager

RES/dot

Mobil Oil Corporation

3225 GALLOWS ROAD
FAIRFAX, VIRGINIA 22037-0001

August 15, 1994

Mobil Marketers and Customers

Mobilith SHC 007
APPLICATION CONSIDERATIONS

Please refer to the previously published Mobil Tech Topic, "Lubrication of Wheel-End Bearing Systems and Steering Gears with Mobilith SHC 007 Semi-Fluid Grease" (TT 1-19).

Because of recent field experience and parts suppliers comments, below are shown some updated recommendations.

The optimum fill level is 20% full. This will provide a level of just at about the level of the bottom rollers, just about the same level as if fluid lube was used. This will normally require that about 1 1/2 - 2 pints of Mobilith SHC 007 be added during assembly. (Levels of 10%-70% full have worked satisfactory).

All parts should be lightly coated with grease to prevent corrosion from condensation.

Hub caps should have only a 5/8 inch "collar". No additional grease should be put into hubcaps. The vent should not be covered.

A reportedly easy way to assemble the units is to use a pressure packer to prepack the bearings, use a hand operated grease pump with a probe to pump 1 1/2 -2 pints of grease into the hub center before the outer bearing is installed. Then install the hubcap after lightly coating the inside of the hubcap and putting a 5/8 inch collar around the outer circumference (inside) of the hubcap.

Service need only be performed if leakage is evident upon inspection.

Questions, performance comments (good or bad), or suggestions should be directed to Bill Pratt at 1-800-662-4525 prompt #7.

R. C. (Dick) Morrow
Applications Engineer
703-849-3748

Mobil Corporation
FAX COVER SHEET

To: Rick Muth Date: 4-21-98

Fax Phone:

From: R. C. Morrow

Fax Phone: 703 754-0586

Phone 703 754-3752

Voice Mail (Audex): 1-800-227 0707 EXT 3748

Comments:

Procedure used at another Mobil customer faxed to Muth from Morrow

WHEEL-END LUBRICATION

For Wheel-Ends Using Mobilith SHC 007 Synthetic Semi-Fluid Grease

SCOPE:

These instructions are intended for use with trailer wheel-ends and truck steer axle wheel bearings.

These wheel-end systems are devided into two types. They are:

1. both inner and outer bearings are the same size
2. the inner bearing is larger than the outer bearing.

Type 2 with the smaller outer bearing is by far the most critical. In this type it is possible to have some lube present in the hub, but not enough to lubricate the outer bearing. This will result in failures and subsequent damage.

INSTALLATION PROCEDURE:

We recommend using a gear oil pump of the type that is commonly mounted on a 35# pail or 120# keg and designed to pump gear oil. (These are readily available from Granger Equipment Supply)

The objective is to end up with a system that has a maximum of 50% of the wheel hub cavity filled with grease, all internal parts with a very light coating of grease, the bearings packed with grease and an unrestricted vented hubcap or axle that is not plugged with grease or other material.

Type 1 wheel-ends will work well with the hub about 30% full while the type 2 (with smaller outer bearing) must have 40-50% of the cavity full and should have a static lube level up to the bottom of the spindle..

Larger hubs will require 1 1/2 to 2 pints of lube while the smaller "TN" type will require about 1 pint.

The recommended procedure is detailed in a video available from Mobil and is reviewed below.

Use new seals and bearings in excellent condition as it will be a long time before the next service.

Either soak the bearings covered with warm (room temperature) Mobilith SHC 007 or preferably pressure pack them prior to installation.

Coat all internal surfaces, seals, nuts etc. with a light coating of grease for corrosion protection purposes and to ease assembly.

Install the inner prepacked bearing and inner seal. Mount the hub on the spindle and pump the required minimum (at least 8 ounces) into the hub using the gear oil pump.

Install the prepacked outer bearing, and adjust the bearings to allow .001 to .005 inches of endplay according to the TMC published procedure.

Install the hubcap making sure that the vent is free of grease and unobstructed.

PM Service

During routine PM service inspect the inner side of the hub for obvious leakage. (If leakage is occurring it will be because the venting is inadequate or the hub was filled more than 80% full) Correct leakage problems.

We recommend some type of follow-up inspection between 100k and 200k miles to insure the outer bearing is getting lubricated and that there is enough grease in the hub. This is especially important with the wheel-end systems using the small outer bearing. A visual inspection through the inspection plug or after removing the hubcap should be sufficient. If inadequate grease is suspected, pull the outer bearing to make sure of an adequate amount of grease. Replenish if necessary.

On trailers that are hauled on railcars we, also, recommend an end play check at 250k-300k miles because of the tendency of these wheel- ends to develop higher clearances. The constant vibrations from the rail cars will eventually wear flat spots on the bearing rollers.

TECHNICAL SUPPORT

For questions or problems please contact the Mobil Customer Response Center at 1-800 662 4525.

R. C. Morrow
R. C. Morrow
Applications Engineer
Automotive Products
Mobil Oil -

X - Cerpt

CONCLUSIONS

After our inspections, the group sat down to discuss findings and possible failure scenarios. Two findings discussed by the group were most important to note.

- All bearings had pre-loading rather than the recommended .001" to .005" end play. All bearings showed at least some discolored grease (orange) around the bearing bores, signs of fretting wear. The bearings and spindles with the highest pre-load showed the most evidence of fretting wear. Higher pre-load will increase the rate of creep of the bearing inner races, leading to fretting wear, increased temperatures, and decreased bearing life.

- All bearings had insufficient quantities of Mobilith SHC 007 in the hub to provide maximum service life. The greatest amount found in any hub was approximately 10 ounces, but the recommended fill quantity for these hubs is 1.5 to 2 pints (24 to 32 ounces) per hub. This is especially critical in this axle design with the tapered spindle. The smaller, outer bearing sits higher in the hub relative to the grease level than the larger, inner bearing. If insufficient grease is present, the outer bearing will tend to become starved of lubricant, increasing temperatures and decreasing bearing life.

We feel both of these conditions would lead to premature bearing failure. We feel the high pre-loads and low grease quantities in the two undamaged hubs of the suspension from trailer number 9U4-1021-10 indicate the same conditions were present on the curb-side *rear* hub. These conditions probably led to a premature bearing failure, allowing the wheel drum to contact the brake pads while the trailer was still moving down the road. This would have led to tremendous amounts of friction and associated heat, which probably ignited combustible material around the wheel causing the trailer fire.

X - Expt

INSPECTION OF TRAILER [redacted]

[redacted] Trailers obtained the suspension from the trailer that burned down in Las Vegas, Nevada. We spent the morning with the Timken and Dana reps examining the suspension components, taking photographs, determining lock nut torques and bearing pre-loads, and pulling available samples of Mobilith SHC 007 still present in the hubs of the burned trailer's suspension.

We examined the curb-side rear spindle, which sustained the most damage. The spindle was plastically deformed, with scoring and wear pattern indicating the wheel was still turning and the spindle was carrying the load after the bearings had been destroyed. The damage was entirely on the loaded, bottom side of the spindle. The upper, unloaded side of the spindle showed little damage, with bearing markings and manufacturer's paint still evident on the inner race of the outer bearing.

The curb-side front wheels were still in place with parts of the tire still attached. The inner tire showed a worn patch which may have been due to a brake lock-up or fire damage. The hub assembly was severely rusted, probably from water and chemicals used in firefighting. It was noted the set screws on the lock nut were missing, not just sheared off in their holes.

The road-side hubs were relatively intact. We observed the hubcaps being removed and [redacted], [redacted], checked the end play and lock nut torque on both hubs. We inspected and took all remaining grease in each hub as samples for further laboratory examination.

The grease from the road-side front hub was dark, with expected consistency for approximated service duty. Approximately three ounces of grease was present in the hub. The outer bearing had sparse grease coverage. When cleaned of grease, the outer bearing showed evidence of staining possibly indicating exposure to excessive heat. The inner bearing was liberally coated with grease and looked to be in perfect condition. There was evidence of fretting wear between bearing bores and spindle. The grease was discolored around the bearing bores to an orange color indicating presence of rust, commonly found as fretting wear particles oxidize. The spindle was measurably worn where the the inner and outer bearings supported the shaft. This in conjunction with the evidence of fretting wear indicates excessive rotation of the bearing races on the spindle. Also, the manufacture date of the hub's rear seal was checked and determined to be 1997.

The grease from the road-side rear hub appeared older, with more clumpy and thicker consistency. There were only one to two ounces of grease present in the hub. Both bearings appeared to be in good condition, with the inner bearing having better grease coverage than the outer bearing. The same orange color was observed under and around the bores of the inner and outer bearings, indicating fretting wear.

INSPECTION OF TRAILER HUBS AT [redacted] TRUCKING, [redacted]

At that point we went to [redacted], to inspect several hubs from trailers in service at [redacted]. The intent was to inspect trailers in service since 1996, 1995, and 1994 to determine hub, bearing and grease condition in various stages of service life. We confine our statements to the grease condition, bearing grease coverage and amount of grease present.

Trailer 1- Serial Number: [redacted]
Date of Manufacture: 3/94

- Curbside Rear Hub -
Hub had approximately eight ounces of grease. The grease appeared too stiff, possibly approaching an NLGI Grade 2 consistency (new Mobilith SHC 007 is an NLGI Grade 00 consistency.) Grease appeared to have at least three different colors in it - red, purple and brown. Possibly relubricated with greases other than Mobilith SHC 007? The inner bearing had good grease coverage, the outer bearing had less coverage, but appeared to be in good condition. Orange discoloration around bearing bores indicates fretting wear.

- Curbside Front Hub -
Hub was very similar to rear hub, having approximately eight ounces of grease. The grease again appeared too thick. This grease also seemed to have the same three colors, and the orange discoloration around the bearing bores. The bearings had similar grease coverage to that mentioned above.

Trailer 2- Serial Number: [redacted]
Date of Manufacture: 8/96

Curbside Rear Hub -
No grease present in the hub. The inner and outer bearings had poor grease coverage, but appeared to be in good condition. Orange discolored grease around bearing bores indicates fretting wear. This hub would have failed prematurely due to an inadequate amount of grease.

- Curbside Front Hub -
This hub was identical to that described above. No grease was present in the hub, and the bearings had poor grease coverage. Orange discolored grease was present around bearing bores, especially the outer bearing, indicating fretting wear. This hub would also have failed prematurely due to inadequate grease supply.

Trailer 3- Serial Number: [redacted]
Date of Manufacture: 10/95

- Curbside Rear Hub -
Hub had approximately 10 ounces of grease present. This grease was in excellent condition, with dark red to black color. The consistency was very good, appearing to be exactly the right thickness for the approximated service duty. Both bearings had good grease coverage. Only slight orange discolored grease presence noticed by outer bearing bore.

- Curbside Front Hub -
This hub was identical to that described above.

RECOMMENDATIONS

We recommend the following steps be taken to eliminate the problems noted during our inspection and help maximize bearing and grease life.

- Use proper bearing greasing procedures.

  The bearings should be packed using a bearing grease packer, then an additional 1.5 to 2 pints (depending on the size of the hub) should be installed between the bearings in the hub. The fill level on the hub should be at least to the spindle. This should insure complete coverage of the outer (lower) bearing rollers.

  This isn't easy, but a gear oil pump (one model available from Grainger for $35) works very well on a 35 lb. pail. Install the packed inner bearing and seal, mount the hub on the spindle and before the outer bearing is installed, pump in the necessary amount of grease. Then install the packed outer bearing.

- Utilize proper bearing lock nut torque procedures.

  Don't over torque the nuts. We recommend the published TMC method of adjusting bearings. Bearings adjusted too loose will result in a little shorter bearing life, bearings installed too tight will fail within a short time. The result should be an end play of .001-.005 inches.

- Check the outer bearing grease coverage and/or hub grease level periodically.

  We recommend checking for leaks at regular service intervals, and visually checking outer bearings at least every 200,000 miles to insure they are getting enough grease. If the axle manufacturer recommends end play inspections, use that opportunity to pull the outer bearing and check grease level. The level should be at least to the spindle, preferably to the level of the outer bearing rollers.

Respectfully submitted

MOBIL OIL CORPORATION

Daniel R. Kellen
Region Engineering Manager

Richard G. Morrow
Application Engineer

Handed out by Dick Morrow at Atlanta Mtg.

DRAFT - NOT FOR PUBLICATION

May 1998

For Wheel-Ends Using Mobilith SHC 007 Synthetic Semi-Fluid Grease

SCOPE:

These instructions are intended for use with non-driven trailer wheel-ends and non-driven truck steer axle wheel bearings.

(TMC Bulletin "Recommendations For Wheel End Lubrication ", RP 631, should be consulted for additional installation information.)

These wheel-end systems are divided into two types. They are:

1. both inner and outer bearings are the same size
2. tapered spindle where the inner bearing is larger than the outer bearing.

Type 2 with the smaller outer bearing lubrication application and maintenance is by far the most critical. In this type it is possible to have some lube present in the hub, but not enough to lubricate the outer bearing. Insufficient lubrication can result in failures and subsequent damage.

INSTALLATION PROCEDURE:

We recommend using a gear oil pump of the type that is commonly mounted on a 35#-pail or 120#-keg and designed to pump gear oil. (These are readily available from most maintenance equipment suppliers). There is also a "positive displacement" pump available that is graduated for specific quantities and fitted with a stop to insure correct quantities of grease are installed. (The list price on these pumps is around $200.00).

The objective is to end up with a system that has a *minimum* of 40% and a *maximum* of 50% of the wheel hub cavity filled with Mobilith SHC 007 grease to insure outer bearing lubrication. All internal parts should have a very light coating of Mobilith SHC 007 grease and the bearings packed with Mobilith SHC 007 grease. An unrestricted vented hubcap or vented axle that is not plugged with grease or other material should be used.

All current wheel-ends will work well with the hub between 40% and 50% full and the designs with the smaller outer bearing should have a grease level up to the bottom of the spindle. *The hub manufacturer should be consulted for the specific amount of grease needed in the hub, and any special considerations required for that particular hub.*

As a general guideline, larger hubs will require 1 1/2 to 2 pints of lube while the smaller type will require about 1 pint. Consult the hub manufacturer for the capacity of a particular hub.

General recommendations for filling hubs with **Mobilith SHC 007** are detailed in a video available from **Mobil** and are reviewed below. *Consult the hub manufacturer for specific recommendations for a particular hub.*

Use new seals and bearings in excellent condition as it will be a long time before the next service.

Either soak the bearings in warm (room temperature) **Mobilith SHC 007** or preferably pressure pack them prior to installation.

Coat all internal surfaces, spindles, seals, nuts etc. with a light coating of **Mobilith SHC 007** grease for corrosion protection purposes and to ease assembly.

Install the inner prepacked bearing and inner seal. Mount the hub on the spindle and pump the required amount into the hub using the appropriate pump.
(If equipped with a fill plug in the hub, the proper amount of grease can be pumped in after the hub is assembled.)

Install the prepacked outer bearing, and adjust the bearings to allow .001 to .005 inches of endplay according to the TMC published procedure. (For special hub designs, such as preassembled units, follow manufacturer's recommendations.)

Install the hubcap making sure that the vent is free of grease and unobstructed.

PM Service

We recommend following hub manufacturer's recommendations.
As a minimum, during routine PM service inspect the inner side of the hub for obvious leakage. (If leakage is occurring it will probably be because the venting is inadequate or the hub was filled more than 80% full) Correct leakage problems.

Because of some recent instances of hubs being inadequately filled, we recommend some type of follow-up inspection between 100k and 200k miles to insure the outer bearing is getting lubricated and that there is enough grease in the hub. This is especially important with the wheel-end systems using the smaller outer bearing.

A visual inspection through the inspection plug or after removing the hubcap should be made. If inadequate grease is suspected (signs of overheating, excessive end-play, or obvious lack of grease), pull the outer bearing to make sure of an adequate amount of grease. Replenish if necessary.

On trailers that are hauled on railcars we, also, recommend an end play check at 250k-300k miles because of the tendency of these wheel- ends to develop higher clearances. The constant vibrations from the rail cars will eventually wear flat spots on the bearing rollers and can distort the spindle shoulders.

TECHNICAL SUPPORT

For questions or problems please contact the Mobil Customer Response Center at 1-800 662 4525.

Dick Morrow

R. C. Morrow
Applications Engineer
Automotive Products
Mobil Oil

WHLEND2.doc

Has [illegible] changed formula ?

Does evaporation change ?
Characteristics of 007 ?
less flowability ?

vented axles ?

air in lube from pump ?

Although the model regulation specifies a 0.5g rearward force and wood floor friction is around 0.3, rear doors should not be used for securing cargo. Cargo at the rear should be blocked and braced. It was decided that in RP No. 47 the term, wall structures, should not include rear doors.

A member suggested specifying a minimum van sidewall strength based on the Association of American Railroads intermodal trailer side wall requirement of 0.3g with no more than 1/2 inch permanent deformation. Another member was of the opinion that side doors might not meet the AAR requirement.

The Cargo Securement Task Force is to review all the comments and propose a further revision of RP No. 47.

Wheel Bearing Lubrication

It was reported that there have been 50 to 100 wheel bearing failures due to a lack of lubrication occurring in trailers experiencing 100,000 to 200,000 miles and in a few trailers with 400,000 miles. In most cases failures have been dry outer bearings in tapered spindles. However, there have been 1 or 2 wheel bearing failures in straight spindles. It was reported that some hubs appear to direct lubricant away from the bearings (see enclosed sketch). It was pointed out that wheel bearings with synthetic lubricants run about 20°F higher than those with oil. It was reported that the viscosity of some synthetic lubricants varied with batch. One axle supplier does not recommend that synthetic lubricant be used with their tapered spindles. Axle suppliers recommended that wheel bearings lubricated with synthetic lubricants be inspected every 100,000 miles or one year, whichever comes first.

Rear Impact Guard

It was noted that a number of fleets would like a guard developed for van trailers which has standard vertical and horizontal members which could be assembled with bolts. It was noted that three firms are presently marketing rear impact guards to trailer manufacturers. Due to the different construction of trailers, it appeared unlikely that a standard could be readily established. It was, however, decided to ask the Board for guidance as to whether TTMA should explore the possibility of developing general guard repair and replacement guidelines. Postscript: The Board later decided that TTMA should not take the lead in guard maintenance issues.

The Committee reviewed the NHTSA interpretation addressed to the National Truck Equipment Association and questioned when a trailer with a tuckaway lift gate would not be considered a special purpose vehicle per FMVSS 224. Gerry Sill of Stoughton Trailers and Ron Zubko of Strick Corp. volunteered to send to the TTMA office sketches of various tuckaway liftgates which should be forwarded to NHTSA to seek an interpretation as to whether trailers fitted with such liftgates would be defined as special purpose trailers per FMVSS 224.

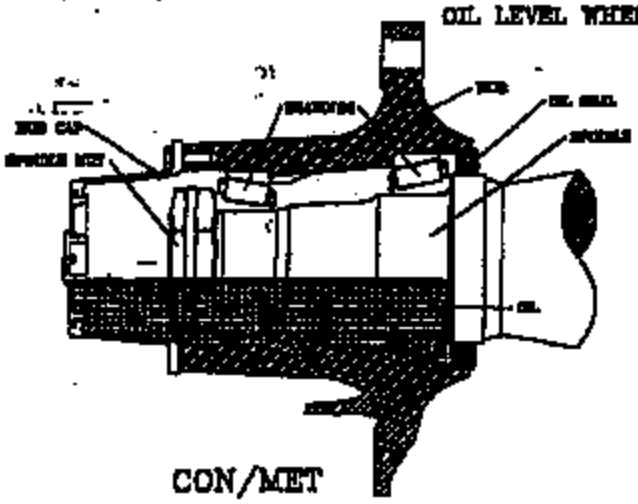
The Committee also decided to petition NHTSA to allow the guard certification label to be located anywhere on the guard's horizontal member on the curb side half of a trailer.

TN TRAILER HUBS

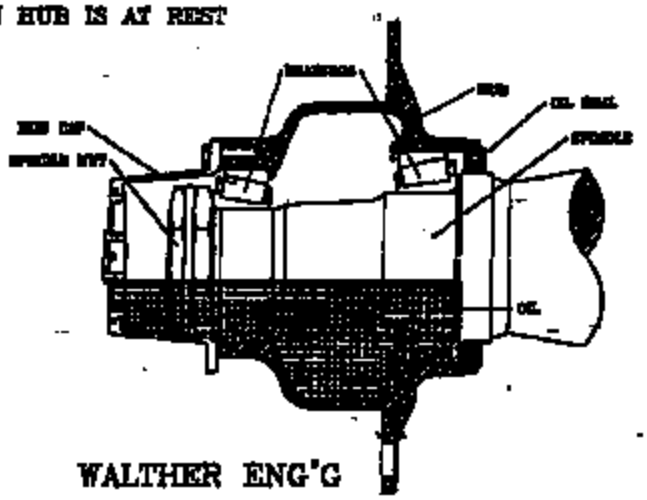
CALCULATED OIL LEVELS AT REST AND IN MOTION

STATIC CONDITION

OIL LEVEL WHEN HUB IS AT REST



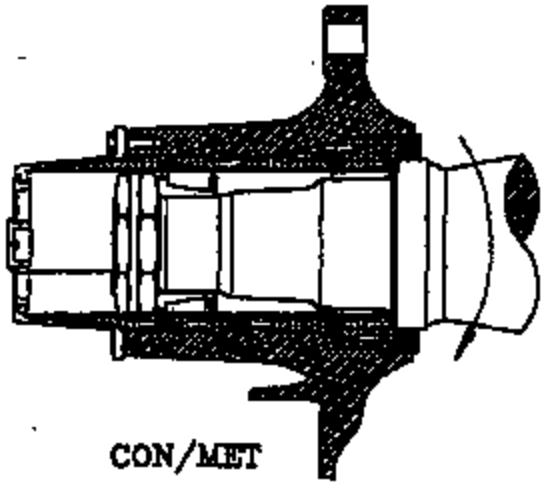
CON/MET



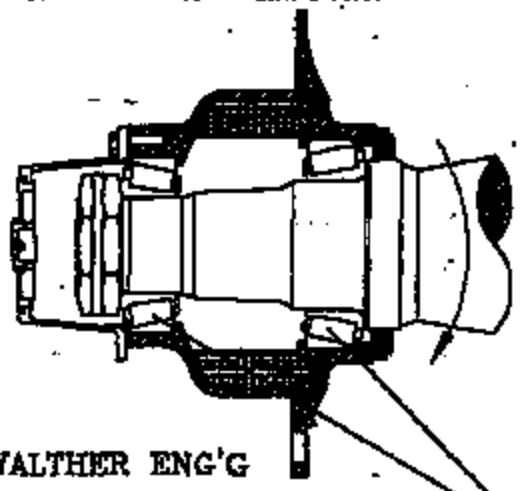
WALTHER ENG'G

DYNAMIC CONDITION

OIL IS PUSHED TO THE OUTSIDE OF THE CAVITY BY CENTRIFUGAL FORCE



CON/MET



WALTHER ENG'G

NOTE THAT BEARINGS ARE NOT IN CONTACT WITH OIL

CONSOLIDATED METCO, INC.

During the Monday afternoon meeting it was reported that NHTSA needs information as to how much time is required to perform the energy absorption test in steps per TTMA's petition of March 26, 1998. A member reported that they performed this type of test in about twelve minutes.

The FHWA issued a notice of proposed rulemaking in the May 14, 1998 Federal Register proposing that the guard width, height, inset, cross-section and labeling requirements of FMVSS 223 and 224 be maintained. The FHWA is not proposing a retrofit, but requests comments on the cost of such a retrofit. FHWA requests comments on the proposed rule by July 13th.

The Maintenance Council during their June 22, 1998 meeting in Milwaukee will be discussing rear impact guard compatibility with dock locks and how to repair and replace rear impact guard components. TMC will be seeking guidance from trailer manufacturers on repair and replacement. In the past TTMA has recommended automatic chocks as an alternative to dock locks which hold the trailer's guard.

AIAG

The Maintenance Council has decided to let the Automotive Industry Action Group (AIAG) develop means of providing floors capable of transporting automotive parts. The AIAG may develop a video for inspecting trailers prior to loading. The AIAG is also concerned with general dock/trailer compatibility including dock/trailer restraints. The next AIAG meeting is June 3, 1998 in Detroit.

Wheel Bearing Lubrication

It was reported that there have been about 25 to 30 incidents of inadequate wheel bearing lubrication and about four fires resulting from this lack of lubrication. The incidents have occurred on trailers with tapered spindles using low maintenance, long life, synthetic lubricant. This subject was discussed at a meeting held May 24, 1998 in Atlanta and sponsored by Spicer Trailer Products (Dana) and Mobil.

The outer bearing on tapered spindles appears to become "starved" of lubrication. This problem appears after the trailer has been pulled 150,000 to 400,000 miles. There has been conflicting information as to the amount of lubricant which should be placed into the wheel bearing cavity. A task force is being established to make an inspection of wheel bearings in the field. Persons wishing to participate in this task force should contact Dick Morrow at Tel. 703-754-3752, or Fax 703-754-0586. In the meantime, Mobil is suggesting that the hub be checked for proper lubrication every year or about every 100,000 miles. It has been estimated that about 500,000 trailers have been using Mobilith SHC 007 semi-fluid grease.

Mobil Oil Corporation

3225 GALLOWS ROAD
FAIRFAX, VIRGINIA 22037-0001

August 15, 1994

Mobil Marketers and Customers

Mobilith SHC 007
APPLICATION CONSIDERATIONS

Please refer to the previously published Mobil Tech Topic, "Lubrication of Wheel-End Bearing Systems and Steering Gears with Mobilith SHC 007 Semi-Fluid Grease" (TT 1-19).

Because of recent field experience and parts suppliers comments, below are shown some updated recommendations.

The optimum fill level is 20% full. This will provide a level of just at about the level of the bottom rollers, just about the same level as if fluid lube was used. This will normally require that about 1 1/2 - 2 pints of Mobilith SHC 007 be added during assembly. (Levels of 10%-70% full have worked satisfactory).

All parts should be lightly coated with grease to prevent corrosion from condensation.

Hub caps should have only a 5/8 inch "collar". No additional grease should be put into hubcaps. The vent should not be covered.

A reportedly easy way to assemble the units is to use a pressure packer to prepack the bearings, use a hand operated grease pump with a probe to pump 1 1/2 -2 pints of grease into the hub center before the outer bearing is installed. Then install the hubcap after lightly coating the inside of the hubcap and putting a 5/8 inch collar around the outer circumference (inside) of the hubcap.

Service need only be performed if leakage is evident upon inspection.

Questions, performance comments (good or bad), or suggestions should be directed to Bill Pratt at 1-800-662-4525 prompt #7.

Dick

R. C. (Dick) Morrow
Applications Engineer

Mobil

R. C. (DICK) MORROW
Sr. Staff Engineer

MOBIL OIL CORPORATION
3225 Gallows Road
Fairfax, Virginia 22037

(703) 849-3746

Mobil Oil Corporation

3225 GALLOWS ROAD
FAIRFAX, VIRGINIA 22037-0001

September 7, 1994

Mr. Charles E. Reagan
Manager, Heavy Duty Products
Freudenberg NOK
47690 East Anchor Court
Plymouth, MI 48170-2455

Dear Mr. Reagan:

Per the July 20, 1994, meeting held by CRST and concerning Mobilith SHC 007, the response from our technical department is attached for your review. Specifically, Paragraphs 5 and 6 address the recommended amount of grease that should be placed in the hub cap.

Should you have additional questions concerning this issue, please do not hesitate in contacting Mr. Bill Pratt at 1-800-662-4525, prompt #7, or myself at the number found below.

Sincerely,

W J Patterson

W. J. Patterson
National Account Manager - Midwest
National Accounts Sales Division
1-800-227-0707, Ext. 1526

Enclosure

cc: P. G. Millett

AIR OPERATED LUBRICATORS

Power-lube P2 (called MAXI-LUBE in USA and Canada)
Maxi-lube P5

MODEL P2 DESIGNED TO FIT ORIGINAL REFINERY GREASE PAILS 25 lb-45 lb (12 kg-22 kg). MODEL P5 FITS 110 lb-420 lb (50 kg-45 kg) DRUMS.

Power-lube is portable, fast and simple to use. Booster gun can attain 10,000 psi (69 MPa) if required.

Sealed unit designed for field and most industrial applications. Virtually maintenance free.

The ultimate tool for low cost, fast and efficient air powered greasing.

Features

- Pump ratio 50:1.
- Suits compressors from 3 cfm (0.08m³) and air pressure from 60-125 psi (400-850 kPa)
- Booster gun gives up to 10,000 psi greasing pressure.
- 3' (4 m) grease delivery hose and 360° swivel joint.
- Handles greases up to No. 2 consistency.
- Optional drum trolleys available TR5 suits Model P2/TR6 suits Model P5

Model P5 shown complete with optional TR6 trolley

*Pneumatic regulator and quick release coupler supplied as standard equipment in USA and Canada — optional for other countries.

MANUALLY OPERATED

Grease Pump

JS15 GREASE PUMP

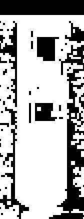
DESIGNED TO FIT ORIGINAL REFINERY GREASE PAILS 25 lb-45 lb (12 kg-22 kg). MODEL JS FITS 110 lb-420 lb (50 kg-45 kg) DRUMS.

This portable filler pump complements the R0024 and R0007 Mini-lubes (page 2) and being fully sealed provides contamination-free grease transfer.

Features

- High volume output per stroke.
- Standard rubber-edged Follower Plate.
- Can be used to transfer other materials of similar viscosity.
- May be used to reload grease guns fitted with a filler nipple.
- Optional drum trolleys available. TR5 (as illustrated) suits Model JZ. TR6 suits Model JS.

Mobil
AV Lubricants Inc.
George Morrison
3520 Rohr Rd.
Groveport, OH 43125
614-492-2000 - Tel.
614-492-2006 - Fax
800-688-6457 - Order



FLEXIBLE EXTENSION

Popular, precision engineered grease gun designed for easy, single hand operation. 3-way filling — bulk, cartridge or JZ grease pump. Up to 7,500 psi (52 MPa) greasing pressure.

Flexible extension for hard-to-reach.

Spare parts readily available.

LEVERGUN K34

16 oz (450 g) capacity

Popular lever action model for high pressure greasing. 3-way filling — bulk, cartridge or JZ grease pump. Rigid nozzle with coupler. Up to 7,500 psi (52 MPa) greasing pressure. Fully serviceable.

POWER-PISTOL K53 / K54

3-way filling — bulk, cartridge or JZ grease pump.

Greasing pressures up to 5,000 psi.

Ideal for changing oil in sumps and ...

Accessory Kits

Mobil Oil Corporation

14060 Timothy Dr.
Gainesville, Va.
20155
703-849 3745

Jeff Sumwalt, Buyer
Strick Trailers
Monroe, Ind

June 4, 1998

Transport America
Hays Hub Recommendations

In an effort to insure that the Hays wheel and hub assemblies have enough grease, I have contacted Mr. Bill Wolf of Hays. He informs me that that particular design of hub has rather limited space for lube and that adding about 13 ounces of Mobilgrease 007 will fill the hub just above 40% full, which is the correct specification.

In addition to the 13 ounces that should be pumped in at assembly it is also necessary to also prepack the bearing with Mobilith SHC 007.

For your additional information I have included the latest Mobil recommendations for the use of Mobilith 007 as a wheel end lubricant.

If you or any of your people have any further questions, please call me at 703 754 3752.

Dick Morrow
R. C. Morrow
Applications Engineer
Mobil Oil

May 1998

For Wheel-Ends Using Mobilith SHC 007 Synthetic Semi-Fluid Grease

SCOPE:

These instructions are intended for use with non-driven trailer wheel-ends and non-driven truck steer axle wheel bearings.

(TMC Bulletin "Recommendations For Wheel End Lubrication ", RP 631, should be consulted for additional installation information.)

These wheel-end systems are divided into two types. They are:

1. both inner and outer bearings are the same size
2. tapered spindle where the inner bearing is larger than the outer bearing.

Type 2 with the smaller outer bearing lubrication application and maintenance is by far the most critical. In this type it is possible to have some lube present in the hub, but not enough to lubricate the outer bearing. Insufficient lubrication can result in failures and subsequent damage.

INSTALLATION PROCEDURE:

We recommend using a gear oil pump of the type that is commonly mounted on a 35# pail or 120# keg and designed to pump gear oil. (These are readily available from most maintenance equipment suppliers). There is also a "positive displacement" pump available that is graduated for specific quantities and fitted with a stop to insure correct quantities of grease are installed. The list price on these pumps is around $200.00).

The objective is to end up with a system that has a *maximum* of 50% of the wheel hub cavity filled with Mobilith SHC 007 grease to insure outer bearing lubrication. All internal parts should have a very light coating of Mobilith SHC 007 grease and the bearings packed with Mobilith SHC 007 grease. An unrestricted vented hubcap or vented axle that is not plugged with grease or other material should be used.

All current wheel-ends will work well with the hub about 40% full and the designs with the smaller outer bearing should have a grease level up to the bottom of the spindle.. *The hub manufacturer should be consulted for the amount of grease needed in the hub, and any special considerations required for that particular hub.*

As a general guideline, larger hubs will require 1 1/2 to 2 pints of lube while the smaller type will require about 1 pint. Consult the hub manufacturer for the capacity of a particular hub.

General recommendations for filling hubs with **Mobilith SHC 007** are detailed in a video available from **Mobil** and are reviewed below. *Consult the hub manufacturer for specific recommendations for a particular hub.*

Use new seals and bearings in excellent condition as it will be a long time before the next service.

Either soak the bearings in warm (room temperature) **Mobilith SHC 007** or preferably pressure pack them prior to installation.

Coat all internal surfaces, spindles, seals, nuts etc. with a light coating of **Mobilith SHC 007** grease for corrosion protection purposes and to ease assembly.

Install the inner prepacked bearing and inner seal. Mount the hub on the spindle and pump the required amount into the hub using the appropriate pump.
(If equipped with a fill plug in the hub, the proper amount of grease can be pumped in after the hub is assembled.)

Install the prepacked outer bearing, and adjust the bearings to allow .001 to .005 inches of endplay according to the TMC published procedure. (For special hub designs, such as preassembled units, follow manufacturer's recommendations.)

Install the hubcap making sure that the vent is free of grease and unobstructed.

PM Service

We recommend following hub manufacturer's recommendations.
As a minimum, during routine PM service inspect the inner side of the hub for obvious leakage. (If leakage is occurring it will probably be because the venting is inadequate or the hub was filled more than 80% full) Correct leakage problems.

As some recently inspected hubs were found to be low on grease, we recommend some type of follow-up inspection between 100k and 200k miles to insure the outer bearing is getting lubricated and that there is enough grease in the hub. This is especially important with the wheel-end systems using the smaller outer bearing.

A visual inspection through the inspection plug or after removing the hubcap should be made. If inadequate grease is suspected (obvious lack of grease), pull the outer bearing to make sure of an adequate amount of grease. Replenish if necessary. If there is any sign of overheating or component damage, the wheel-end system should be redone.

On trailers that are hauled on railcars we, also, recommend an end play check at 250k-300k miles because of the tendency of these wheel- ends to develop higher clearances. The constant vibrations from the rail cars will eventually wear flat spots on the bearing rollers and can distort the spindle sholders..

TECHNICAL SUPPORT

For questions or problems please contact the Mobil Customer Response Center at 1-800 662 4525.

Dick Morrow
R. C. Morrow
Applications Engineer
Automotive Products
Mobil Oil

007-95

TECHNICAL PRODUCT APPLICATION ADVICE

Mobilith SHC 007
As used in Rockwell (and other similar design) TN Model Axles

In field service there have been some service problems noted in wheel hub designs where the outer bearing is smaller than the inner bearing. This generally applies to some trailer wheel hubs (notably Rockwell TN Series), some Eaton axles, and some steer axle hubs.

The problem is that in some designs there is a "dam" formed by the outer bearing seat machined into the hub. If there is insufficient lube in the hub, either oil or semi-fluid grease, the "dam" can cause starvation and eventually failure of the outer bearing.

The fill level in the hub is recommended to be even with the bottom of the spindle to insure adequate lubrication. It may also be necessary to keep the hubcap 1/3 full also. This requires making sure that there is adequate ventilation provided by the hubcap or a vent hole drilled in the end of the axle. (The vent hole drilled in the end of the axle is standard on Rockwell units, but will not work on solid spindles)

It is also recommended that these units be inspected by either removing the hubcap or using the inspection hole on a periodic basis of about 100,000 miles. The purpose of the inspection is just to insure that there is evidence that the outer bearing is getting grease. There is no need to do any additional service, unless the outer bearing is dry.

For questions or further clarification of this subject, please contact the Mobil Customer Response center at 1-800-662-4524

R. C. Morrow
Applications Engineer

EA03-022

STRICK CORPORATION

1/29/04 LETTER TO ODI

RESPONSE TO REQUEST 12

RESPONSE TO REQUEST # 12

Describe all assessments, analyses, test, test results, studies, surveys, simulations, investigations, injures and/or evaluations (collectively, "actions") that have been conducted, are being conducted, are planned, or being planned by, or for, or with Strick's knowledge, that relate to, or may relate to the alleged defect. For each action, provide the following information:

a-Action title or identifier;

None

b-The actual or planned start date;

None

c-The actual or expected end date;

None

d-Brief summary of the subject and objective of the action;

No action taken

e-Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and

No action taken

f-A brief summary of the findings and/or conclusions resulting from the action.

No action taken

EA03-022

STRICK CORPORATION

1/29/04 LETTER TO ODI

RESPONSE TO REQUEST 13

RESPONSE TO REQUEST # 13

Describe all modifications or changes made by, or on behalf of, Strick in the design, material composition, manufacture, grease type used, quality control, supply, or installation of the subject component, from the start of production to date, which relate to, or may relate to, the alleged defect in the subject vehicles. For each such modification or change, provide the following information:

a-The date or approximate date on which the modification or change was incorporated into production of the subject component;

See attached sheet giving dates the fill level was changed.

b-A detailed description of the modification or change;

The recommended fill level changed several times. Each time Strick installed the amount recommended by the supplier.

c-The reason(s) for the modification or change;

Changes were made advising new recommended fill levels by the supplier.

d-The part numbers (service and engineering) of the original component(s);

Mobil # (Mobil 007) Strick # for same (Danville plant item #17071 and Monroe plant item # 00152

e-The part numbers (service and engineering) of the modified component(s);

The component was not modified just the installation procedures changed.

f-Whether the original unmodified component, and/or grease type, was withdrawn from production and/or sale, and if so, when;

Product was not with drawn from production, only the fill levels were changed.

g-When the modified component was made available as a service component; and

See attached date on spreadsheet.

h-Whether the modified component can be interchanged with earlier production components.

Product not modified, only changed the fill level recommended by supplier.

INSTRUCTIONS FOR WHEEL END LUBRICATION

05-May-98

FROM	DATE	TYPE	FILL LEVEL	FILL AMOUNT	HUBCAP	SERVICE INTERVAL	COMMENT
MOBIL	04/09/1996	MEMO	"TO THE SPINDLE"			200K TO 300K MILES	
MOBIL	09/01/1997	TECHNICAL ADVICE	"EVEN WITH BOTTOM OF SPINDLE"		MAY BE NECESSARY TO FILL 1/8	INSPECT EVERY 100,000 MILES	SAYS PROBLEM CAUSED BY "DAM" FORMED BY OUTER BEARING SEAT MACHINED INTO HUB ON TN TYPE AXLES
MOBIL	08/17/1997	TECH TOPIC, 3rd AD.	"ABOUT 20% FULL", BUT USED SUCCESSFULLY 10% TO 40% FULL	"REPORTEDLY . . 1-1/2 TO 2 PINTS"		200K TO 300 K IF SEVERE SERVICE OR RAIL	
MOBIL	?	?	"40 TO 50% OF THE CAVITY FULL . . . STATIC LEVEL TO BOTTOM OF SPINDLE"	"ABOUT 1 PINT WITH TN AXLE"		100K TO 200 K MILES	ALSO SAYS "REQUIRED MINIMUM (AT LEAST 8 OUNCES)"
MOBIL	12/09/1994	TECH TOPIC	"20% FULL, BUT CAN BE USED SUCCESSFULLY AT FILL LEVELS OF 10% - 50%"	"REPORTEDLY . . 1-1/2 TO 2 PINTS"		ONLY IF LEAKAGE OBSERVED	
MOBIL	09/15/1994	APPLICATION CONSIDERATIONS	"20% FULL . . . 10% TO 70% FULL HAVE WORKED SATISFACTORILY"	"NORMALLY REQUIRE ABOUT 1-1/2 TO 2 PINTS"	NO ADDITIONAL GREASE SHOULD BE PUT IN HUBCAPS	ONLY IF LEAKAGE OBSERVED	LEVEL JUST "ABOUT LEVEL WITH THE BOTTOM OF THE ROLLERS"
MOBIL	01/14/1994	TECH TOPIC	"50% FULL . . . CAN BE USED SUCCESSFULLY AT FILL LEVELS OF 40% - 70%"				
MERITOR	04/23/1998	PRELIMINARY	"FILL CAVITY 1/3 FULL . ."	"APPROXIMATELY 1.5 POUNDS OF GREASE"	NO ADDITIONAL GREASE IN HUBCAPS		
ROCKWELL	JULY, 1993	MAINTENANCE MANUAL				1 YEAR OR 100,000 MILES	APPLY TO SYNTHETIC?

Mobil Oil Corporation

[redacted]
DALLAS, TEXAS [redacted]
[redacted]

February 11, 1994

Leon Lovett
Stemco Products
PO Box 1989
Longview, TX 75602

Dear Mr. Lovett:

Regarding the proper quantity of Mobilith SHC 007 semi-fluid grease to use when filling wheel end assemblies:

1. Dip each bearing into the grease at room temperature and assemble.

2. Fill the housing not more than 1/3 full with grease.

3. The hub cap may be assembled dry to minimize the effect of grease interfering with the vent system on the center of the cap face. The problem of grease slump-out during assembly of the cap is also thereby avoided, without compromising the lubrication of the bearing system.

Many wheel end applications have been operated with half the amount of semi-fluid grease as compared to oil with very satisfactory results. The above filling procedure should provide optimum bearing and seal life for STEMCO wheel end systems when used in conjunction with Mobilith SHC 007 semi-fluid grease.

Sincerely:

Clark A. Kibler

Clark A. Kibler
Staff Engineer
Equipment Builder Department

cc: B. Braun, Stemco

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1
To Eddie Prince | From John Mattson
Co. | Co.
Dept. | Phone #
Fax # | Fax #

Mobil Oil Corporation

3225 GALLOWS ROAD
FAIRFAX, VIRGINIA 22037-0001

April 26, 1994

Mr. Charles E. Reagan
47690 East Anchor Court
Plymouth, MI 48170

Dear Mr. Reagan:

Confirming our discussion, below is listed a recommended procedure for converting wheel bearing lubrication from oil to Mobilith SHC 007 semi-fluid grease. This procedure is presently followed by established users of 007 such as Carolina Freight and Old Dominion Truck Lines and has proven quite satisfactory.

The installation procedure is as follows:

1. Drain the trailer wheel hub oil.

2. Thoroughly clean the wheel hub and old bearings if being reused upon inspection.

3. Recommend installation using new grease seals.

4. Fill the hub cavity with 007 anywhere from 1/2 to full level (Bottom part of hub is what you are filling).

5. Pack the bearings with a standard hand operated grease wheel bearing packer. Install bearings and grease seals in accordance to axle manufacturers recommendations. You may want to apply a small amount of Mobilith on the spindle as well as the seal lip where it touches the wear ring. Upon completion of bearing and seal installation tighten retainer nuts per manufacturers recommendations.

6. Fill the vented hubcap approximately 1/4 to 1/3 full of 007 grease. Some fleets vary the amount but none ever fill more than 1/3 of hubcap capacity.

7. A vented cap is recommended which helps reduce pressure and heat buildup on wheel end assembly.

I trust this provides the information needed. If there are any questions however, please call me at 1-800-227-0707, extension 1319.

Very truly yours,

R. E. Stevens
National Account Manager

RES/dot

Mobil Oil Corporation

3225 GALLOWS ROAD
FAIRFAX, VIRGINIA 22037-0001

August 15, 1994

Mobil Marketers and Customers

Mobilith SHC 007
APPLICATION CONSIDERATIONS

Please refer to the previously published Mobil Tech Topic, "Lubrication of Wheel-End Bearing Systems and Steering Gears with Mobilith SHC 007 Semi-Fluid Grease" (TT 1-19).

Because of recent field experience and parts suppliers comments, below are shown some updated recommendations.

The optimum fill level is 20% full. This will provide a level of just at about the level of the bottom rollers, just about the same level as if fluid lube was used. This will normally require that about 1 1/2 - 2 pints of Mobilith SHC 007 be added during assembly. (Levels of 10%-70% full have worked satisfactory).

All parts should be lightly coated with grease to prevent corrosion from condensation.

Hub caps should have only a 5/8 inch "collar". No additional grease should be put into hubcaps. The vent should not be covered.

A reportedly easy way to assemble the units is to use a pressure packer to prepack the bearings, use a hand operated grease pump with a probe to pump 1 1/2 -2 pints of grease into the hub center before the outer bearing is installed. Then install the hubcap after lightly coating the inside of the hubcap and putting a 5/8 inch collar around the outer circumference (inside) of the hubcap.

Service need only be performed if leakage is evident upon inspection.

Questions, performance comments (good or bad), or suggestions should be directed to Bill Pratt at 1-800-662-4525 prompt #7.

R. C. (Dick) Morrow
Applications Engineer
703-849-3748

Kevin McKenna

Mobil Corporation

FAX COVER SHEET

To: Rick Muth Date: 4-21-98

Fax Phone:

From: R. C. Morrow

Fax Phone: 703 754-0586

Phone 703 754-3752

Voice Mail (Audex): 1-800-227 0707 EXT 3748

Comments:

Procedure used at another Mobil customer faxed to Muth from Morrow

Where was - This written

WHEEL-END LUBRICATION

For Wheel-Ends Using Mobilith SHC 007 Synthetic Semi-Fluid Grease

SCOPE:

These instructions are intended for use with trailer wheel-ends and truck steer axle wheel bearings.

These wheel-end systems are devided into two types. They are:

1. both inner and outer bearings are the same size
2. the inner bearing is larger than the outer bearing.

Type 2 with the smaller outer bearing is by far the most critical. In this type it is possible to have some lube present in the hub, but not enough to lubricate the outer bearing. This will result in failures and subsequent damage.

INSTALLATION PROCEDURE:

We recommend using a gear oil pump of the type that is commonly mounted on a 35# pail or 120# keg and designed to pump gear oil. (These are readily available from Granger Equipment Supply)

The objective is to end up with a system that has a maximum of 50% of the wheel hub cavity filled with grease, all internal parts with a very light coating of grease, the bearings packed with grease and an unrestricted vented hubcap or axle that is not plugged with grease or other material.

Type 1 wheel-ends will work well with the hub about 30% full while the type 2 (with smaller outer bearing) must have 40-50% of the cavity full and should have a static lube level up to the bottom of the spindle..

Larger hubs will require 1 1/2 to 2 pints of lube while the smaller "TN" type will require about 1 pint.

The recommended procedure is detailed in a video available from Mobil and is reviewed below.

Use new seals and bearings in excellent condition as it will be a long time before the next service.

Either soak the bearings covered with warm (room temperature) Mobilith SHC 007 or preferably pressure pack them prior to installation.

Coat all internal surfaces, seals, nuts etc. with a light coating of grease for corrosion protection purposes and to ease assembly.

Install the inner prepacked bearing and inner seal. Mount the hub on the spindle and pump the required minimum (at least 8 ounces) into the hub using the gear oil pump.

Install the prepacked outer bearing, and adjust the bearings to allow .001 to .005 inches of endplay according to the TMC published procedure.

Install the hubcap making sure that the vent is free of grease and unobstructed.

PM Service

During routine PM service inspect the inner side of the hub for obvious leakage. (If leakage is occurring it will be because the venting is inadequate or the hub was filled more than 80% full) Correct leakage problems.

We recommend some type of follow-up inspection between 100k and 200k miles to insure the outer bearing is getting lubricated and that there is enough grease in the hub. This is especially important with the wheel-end systems using the small outer bearing. A visual inspection through the inspection plug or after removing the hubcap should be sufficient. If inadequate grease is suspected, pull the outer bearing to make sure of an adequate amount of grease. Replenish if necessary.

On trailers that are hauled on railcars we, also, recommend an end play check at 250k-300k miles because of the tendency of these wheel- ends to develop higher clearances. The constant vibrations from the rail cars will eventually wear flat spots on the bearing rollers.

TECHNICAL SUPPORT

For questions or problems please contact the Mobil Customer Response Center at 1-800 662 4525.

R. C. Morrow
R. C. Morrow
Applications Engineer
Automotive Products
Mobil Oil

X - Cerpt

CONCLUSIONS

After our inspections, the group sat down to discuss findings and possible failure scenarios. Two findings discussed by the group were most important to note.

- All bearings had pre-loading rather than the recommended .001" to .005" end play. All bearings showed at least some discolored grease (orange) around the bearing bores, signs of fretting wear. The bearings and spindles with the highest pre-load showed the most evidence of fretting wear. Higher pre-load will increase the rate of creep of the bearing inner races, leading to fretting wear, increased temperatures, and decreased bearing life.

- All bearings had insufficient quantities of Mobilith SHC 007 in the hub to provide maximum service life. The greatest amount found in any hub was approximately 10 ounces, but the recommended fill quantity for these hubs is 1.5 to 2 pints (24 to 32 ounces) per hub. This is especially critical in this axle design with the tapered spindle. The smaller, outer bearing sits higher in the hub relative to the grease level than the larger, inner bearing. If insufficient grease is present, the outer bearing will tend to become starved of lubricant, increasing temperatures and decreasing bearing life.

We feel both of these conditions would lead to premature bearing failure. We feel the high pre-loads and low grease quantities in the two undamaged hubs of the suspension from trailer number 9U4-1021-10 indicate the same conditions were present on the curb-side rear hub. These conditions probably led to a premature bearing failure, allowing the wheel drum to contact the brake pads while the trailer was still moving down the road. This would have led to tremendous amounts of friction and associated heat, which probably ignited combustible material around the wheel causing the trailer fire.

X - Expt

INSPECTION OF TRAILER [redacted]

[redacted] Trailers obtained the suspension from the trailer that burned down in Las Vegas, Nevada. We spent the morning with the Timken and Dana reps examining the suspension components, taking photographs, determining lock nut torques and bearing pre-loads, and pulling available samples of Mobilith SHC 007 still present in the hubs of the burned trailer's suspension.

We examined the curb-side rear spindle, which sustained the most damage. The spindle was plastically deformed, with scoring and wear pattern indicating the wheel was still turning and the spindle was carrying the load after the bearings had been destroyed. The damage was entirely on the loaded, bottom side of the spindle. The upper, unloaded side of the spindle showed little damage, with bearing markings and manufacturer's paint still evident on the inner race of the outer bearing.

The curb-side front wheels were still in place with parts of the tire still attached. The inner tire showed a worn patch which may have been due to a brake lock-up or fire damage. The hub assembly was severely rusted, probably from water and chemicals used in firefighting. It was noted the set screws on the lock nut were missing, not just sheared off in their holes.

The road-side hubs were relatively intact. We observed the hubcaps being removed and [redacted], [redacted], checked the end play and lock nut torque on both hubs. We inspected and took all remaining grease in each hub as samples for further laboratory examination.

The grease from the road-side front hub was dark, with expected consistency for approximated service duty. Approximately three ounces of grease was present in the hub. The outer bearing had sparse grease coverage. When cleaned of grease, the outer bearing showed evidence of staining possibly indicating exposure to excessive heat. The inner bearing was liberally coated with grease and looked to be in perfect condition. There was evidence of fretting wear between bearing bores and spindle. The grease was discolored around the bearing bores to an orange color indicating presence of rust, commonly found as fretting wear particles oxidize. The spindle was measurably worn where the the inner and outer bearings supported the shaft. This in conjunction with the evidence of fretting wear indicates excessive rotation of the bearing races on the spindle. Also, the manufacture date of the hub's rear seal was checked and determined to be 1997.

The grease from the road-side rear hub appeared older, with more clumpy and thicker consistency. There were only one to two ounces of grease present in the hub. Both bearings appeared to be in good condition, with the inner bearing having better grease coverage than the outer bearing. The same orange color was observed under and around the bores of the inner and outer bearings, indicating fretting wear.

INSPECTION OF TRAILER HUBS AT [redacted] TRUCKING - [redacted]

At that point we went to [redacted] to inspect several hubs from trailers in service at [redacted]. The intent was to inspect trailers in service since 1996, 1995, and 1994 to determine hub, bearing and grease condition in various stages of service life. We confine our statements to the grease condition, bearing grease coverage and amount of grease present.

Trailer 1- Serial Number: [redacted]
Date of Manufacture: 3/94

- Curbside Rear Hub -
Hub had approximately eight ounces of grease. The grease appeared too stiff, possibly approaching an NLGI Grade 2 consistency (new Mobilith SHC 007 is an NLGI Grade 00 consistency.) Grease appeared to have at least three different colors in it - red, purple and brown. Possibly relubricated with greases other than Mobilith SHC 007? The inner bearing had good grease coverage, the outer bearing had less coverage, but appeared to be in good condition. Orange discoloration around bearing bores indicates fretting wear.

- Curbside Front Hub -
Hub was very similar to rear hub, having approximately eight ounces of grease. The grease again appeared too thick. This grease also seemed to have the same three colors, and the orange discoloration around the bearing bores. The bearings had similar grease coverage to that mentioned above.

Trailer 2- Serial Number: [redacted]
Date of Manufacture: 8/96

Curbside Rear Hub -
No grease present in the hub. The inner and outer bearings had poor grease coverage, but appeared to be in good condition. Orange discolored grease around bearing bores indicates fretting wear. This hub would have failed prematurely due to an inadequate amount of grease.

- Curbside Front Hub -
This hub was identical to that described above. No grease was present in the hub, and the bearings had poor grease coverage. Orange discolored grease was present around bearing bores, especially the outer bearing, indicating fretting wear. This hub would also have failed prematurely due to inadequate grease supply.

Trailer 3- Serial Number: [redacted]
Date of Manufacture: 10/95

- Curbside Rear Hub -
Hub had approximately 10 ounces of grease present. This grease was in excellent condition, with dark red to black color. The consistency was very good, appearing to be exactly the right thickness for the approximated service duty. Both bearings had good grease coverage. Only slight orange discolored grease presence noticed by outer bearing bore.

- Curbside Front Hub -
This hub was identical to that described above.

RECOMMENDATIONS

We recommend the following steps be taken to eliminate the problems noted during our inspection and help maximize bearing and grease life.

- Use proper bearing greasing procedures.

  The bearings should be packed using a bearing grease packer, then an additional 1.5 to 2 pints (depending on the size of the hub) should be installed between the bearings in the hub. The fill level on the hub should be at least to the spindle. This should insure complete coverage of the outer (lower) bearing rollers.

  This isn't easy, but a gear oil pump (one model available from Grainger for $35) works very well on a 35 lb. pail. Install the packed inner bearing and seal, mount the hub on the spindle and before the outer bearing is installed, pump in the necessary amount of grease. Then install the packed outer bearing.

- Utilize proper bearing lock nut torque procedures.

  Don't over torque the nuts. We recommend the published TMC method of adjusting bearings. Bearings adjusted too loose will result in a little shorter bearing life. bearings installed too tight will fail within a short time. The result should be an end play of .001-.005 inches.

- Check the outer bearing grease coverage and/or hub grease level periodically.

  We recommend checking for leaks at regular service intervals, and visually checking outer bearings at least every 200,000 miles to insure they are getting enough grease. If the axle manufacturer recommends end play inspections, use that opportunity to pull the outer bearing and check grease level. The level should be at least to the spindle, preferably to the level of the outer bearing rollers.

Respectfully submitted

MOBIL OIL CORPORATION

Daniel R. Kellen
Region Engineering Manager

Richard C. Morrow
Application Engineer

Handed out by Dick Monroe at Atlanta Mtg.

DRAFT - NOT FOR PUBLICATION

May 1998

For Wheel-Ends Using Mobilith SHC 007 Synthetic Semi-Fluid Grease

SCOPE:

These instructions are intended for use with non-driven trailer wheel-ends and non-driven truck steer axle wheel bearings.

(TMC Bulletin "Recommendations For Wheel End Lubrication ", RP 631, should be consulted for additional installation information.)

These wheel-end systems are divided into two types. They are:

1. both inner and outer bearings are the same size
2. tapered spindle where the inner bearing is larger than the outer bearing.

Type 2 with the smaller outer bearing lubrication application and maintenance is by far the most critical. In this type it is possible to have some lube present in the hub, but not enough to lubricate the outer bearing. Insufficient lubrication can result in failures and subsequent damage.

INSTALLATION PROCEDURE:

We recommend using a gear oil pump of the type that is commonly mounted on a 35# pail or 120# keg and designed to pump gear oil. (These are readily available from most maintenance equipment suppliers). There is also a "positive displacement" pump available that is graduated for specific quantities and fitted with a stop to insure correct quantities of grease are installed. (The list price on these pumps is around $200.00).

The objective is to end up with a system that has a *minimum* of 40% and a *maximum* of 50% of the wheel hub cavity filled with Mobilith SHC 007 grease to insure outer bearing lubrication. All internal parts should have a very light coating of Mobilith SHC 007 grease and the bearings packed with Mobilith SHC 007 grease. An unrestricted vented hubcap or vented axle that is not plugged with grease or other material should be used.

All current wheel-ends will work well with the hub between 40% and 50% full and the designs with the smaller outer bearing should have a grease level up to the bottom of the spindle. *The hub manufacturer should be consulted for the specific amount of grease needed in the hub, and any special considerations required for that particular hub.*

As a general guideline, larger hubs will require 1 1/2 to 2 pints of lube while the smaller type will require about 1 pint. Consult the hub manufacturer for the capacity of a particular hub.

General recommendations for filling hubs with **Mobilith SHC 007** are detailed in a video available from **Mobil** and are reviewed below. *Consult the hub manufacturer for specific recommendations for a particular hub.*

Use new seals and bearings-in excellent condition as it will be a long time before the next service.

Either soak the bearings in warm (room temperature) **Mobilith SHC 007** or preferably pressure pack them prior to installation.

Coat all internal surfaces, spindles, seals, nuts etc. with a light coating of **Mobilith SHC 007** grease for corrosion protection purposes and to ease assembly.

Install the inner prepacked bearing and inner seal. Mount the hub on the spindle and pump the required amount into the hub using the appropriate pump.
(If equipped with a fill plug in the hub, the proper amount of grease can be pumped in after the hub is assembled.)

Install the prepacked outer bearing, and adjust the bearings to allow .001 to .005 inches of endplay according to the TMC published procedure. (For special hub designs, such as preassembled units, follow manufacturer's recommendations.)

Install the hubcap making sure that the vent is free of grease and unobstructed.

PM Service

We recommend following hub manufacturer's recommendations.
As a minimum, during routine PM service inspect the inner side of the hub for obvious leakage. (If leakage is occurring it will probably be because the venting is inadequate or the hub was filled more than 80% full) Correct leakage problems.

Because of some recent instances of hubs being inadequately filled, we recommend some type of follow-up inspection between 100k and 200k miles to insure the outer bearing is getting lubricated and that there is enough grease in the hub. This is especially important with the wheel-end systems using the smaller outer bearing.

A visual inspection through the inspection plug or after removing the hubcap should be made. If inadequate grease is suspected (signs of overheating, excessive end-play, or obvious lack of grease), pull the outer bearing to make sure of an adequate amount of grease. Replenish if necessary.

On trailers that are hauled on railcars we, also, recommend an end play check at 250k-300k miles because of the tendency of these wheel- ends to develop higher clearances. The constant vibrations from the rail cars will eventually wear flat spots on the bearing rollers and can distort the spindle shoulders.

TECHNICAL SUPPORT

For questions or problems please contact the Mobil Customer Response Center at 1-800 662 4525.

Dick Morrow

R. C. Morrow
Applications Engineer
Automotive Products
Mobil Oil

WHLEND1.doc

Has Mobil changed formula ?

Does evaporation change ?
Characteristics of 007 ?
less flowability ?

vented axles ?
air in lube from pump ?

Although the model regulation specifies a 0.5g rearward force and wood floor friction is around 0.3, rear doors should not be used for securing cargo. Cargo at the rear should be blocked and braced. It was decided that in RP No. 47 the term, wall structures, should not include rear doors.

A member suggested specifying a minimum van sidewall strength based on the Association of American Railroads intermodal trailer side wall requirement of 0.3g with no more than 1/2 inch permanent deformation. Another member was of the opinion that side doors might not meet the AAR requirement.

The Cargo Securement Task Force is to review all the comments and propose a further revision of RP No. 47.

Wheel Bearing Lubrication

It was reported that there have been 50 to 100 wheel bearing failures due to a lack of lubrication occurring in trailers experiencing 100,000 to 200,000 miles and in a few trailers with 400,000 miles. In most cases failures have been dry outer bearings in tapered spindles. However, there have been 1 or 2 wheel bearing failures in straight spindles. It was reported that some hubs appear to direct lubricant away from the bearings (see enclosed sketch). It was pointed out that wheel bearings with synthetic lubricants run about 20°F higher than those with oil. It was reported that the viscosity of some synthetic lubricants varied with batch. One axle supplier does not recommend that synthetic lubricant be used with their tapered spindles. Axle suppliers recommended that wheel bearings lubricated with synthetic lubricants be inspected every 100,000 miles or one year, whichever comes first.

Rear Impact Guard

It was noted that a number of fleets would like a guard developed for van trailers which has standard vertical and horizontal members which could be assembled with bolts. It was noted that three firms are presently marketing rear impact guards to trailer manufacturers. Due to the different construction of trailers, it appeared unlikely that a standard could be readily established. It was, however, decided to ask the Board for guidance as to whether TTMA should explore the possibility of developing general guard repair and replacement guidelines. Postscript: The Board later decided that TTMA should not take the lead in guard maintenance issues.

The Committee reviewed the NHTSA interpretation addressed to the National Truck Equipment Association and questioned when a trailer with a tuckaway lift gate would not be considered a special purpose vehicle per FMVSS 224. Gerry Sill of Stoughton Trailers and Ron Zubko of Strick Corp. volunteered to send to the TTMA office sketches of various tuckaway liftgates which should be forwarded to NHTSA to seek an interpretation as to whether trailers fitted with such liftgates would be defined as special purpose trailers per FMVSS 224.

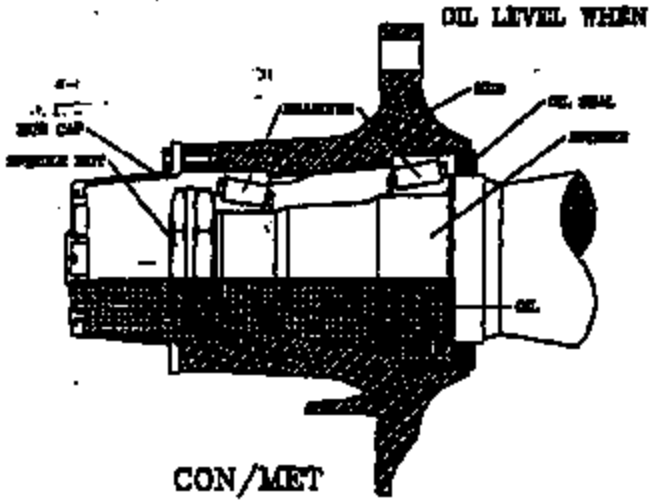
The Committee also decided to petition NHTSA to allow the guard certification label to be located anywhere on the guard's horizontal member on the curb side half of a trailer.

TN TRAILER HUBS

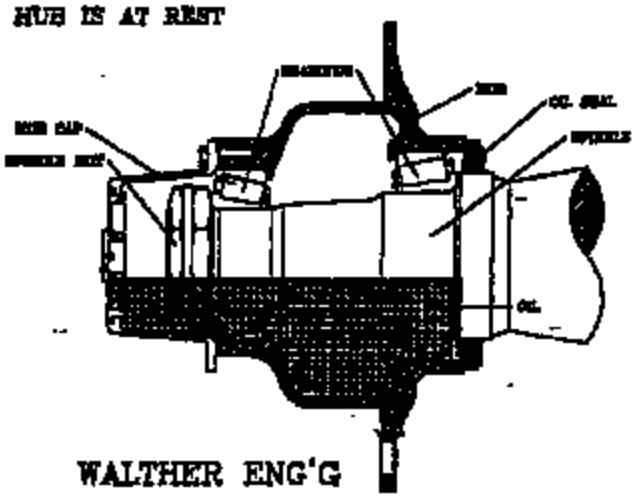
CALCULATED OIL LEVELS AT REST AND IN MOTION

STATIC CONDITION

OIL LEVEL WHEN HUB IS AT REST



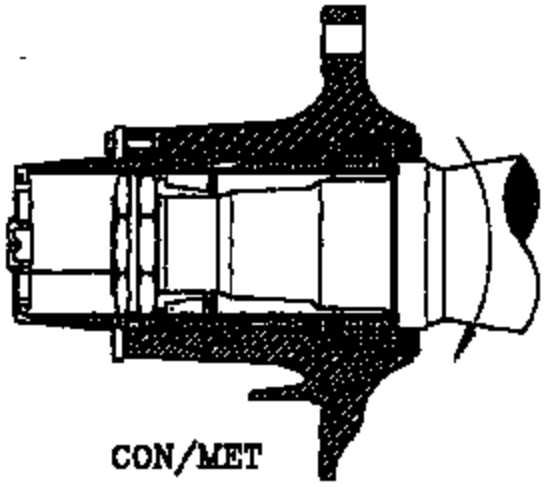
CON/MET



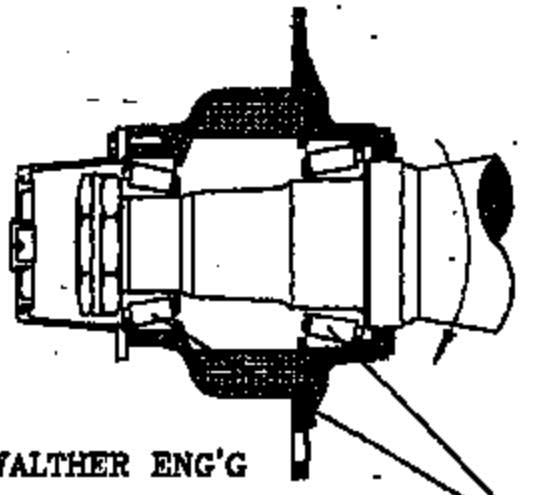
WALTHER ENG'G

DYNAMIC CONDITION

OIL IS PUSHED TO THE OUTSIDE OF THE CAVITY BY CENTRIFUGAL FORCE



CON/MET



WALTHER ENG'G

NOTE THAT BEARINGS ARE NOT IN CONTACT WITH OIL

CONSOLIDATED METCO, INC.

During the Monday afternoon meeting it was reported that NHTSA needs information as to how much time is required to perform the energy absorption test in steps per TTMA's petition of March 26, 1998. A member reported that they performed this type of test in about twelve minutes.

The FHWA issued a notice of proposed rulemaking in the May 14, 1998 Federal Register proposing that the guard width, height, inset, cross-section and labeling requirements of FMVSS 223 and 224 be maintained. The FHWA is not proposing a retrofit, but requests comments on the cost of such a retrofit. FHWA requests comments on the proposed rule by July 13th.

The Maintenance Council during their June 22, 1998 meeting in Milwaukee will be discussing rear impact guard compatibility with dock locks and how to repair and replace rear impact guard components. TMC will be seeking guidance from trailer manufacturers on repair and replacement. In the past TTMA has recommended automatic chocks as an alternative to dock locks which hold the trailer's guard.

AIAG

The Maintenance Council has decided to let the Automotive Industry Action Group (AIAG) develop means of providing floors capable of transporting automotive parts. The AIAG may develop a video for inspecting trailers prior to loading. The AIAG is also concerned with general dock/trailer compatibility including dock/trailer restraints. The next AIAG meeting is June 3, 1998 in Detroit.

Wheel Bearing Lubrication

It was reported that there have been about 25 to 30 incidents of inadequate wheel bearing lubrication and about four fires resulting from this lack of lubrication. The incidents have occurred on trailers with tapered spindles using low maintenance, long life, synthetic lubricant. This subject was discussed at a meeting held May 24, 1998 in Atlanta and sponsored by Spicer Trailer Products (Dana) and Mobil.

The outer bearing on tapered spindles appears to become "starved" of lubrication. This problem appears after the trailer has been pulled 150,000 to 400,000 miles. There has been conflicting information as to the amount of lubricant which should be placed into the wheel bearing cavity. A task force is being established to make an inspection of wheel bearings in the field. Persons wishing to participate in this task force should contact Dick Morrow at Tel. 703-754-3752, or Fax 703-754-0586. In the meantime, Mobil is suggesting that the hub be checked for proper lubrication every year or about every 100,000 miles. It has been estimated that about 500,000 trailers have been using Mobilith SHC 007 semi-fluid grease.

Mobil Oil Corporation

3225 GALLOWS ROAD
FAIRFAX, VIRGINIA 22037-0001

August 15, 1994

Mobil Marketers and Customers

Mobilith SHC 007
APPLICATION CONSIDERATIONS

Please refer to the previously published Mobil Tech Topic, "Lubrication of Wheel-End Bearing Systems and Steering Gears with Mobilith SHC 007 Semi-Fluid Grease" (TT 1-19).

Because of recent field experience and parts suppliers comments, below are shown some updated recommendations.

The optimum fill level is 20% full. This will provide a level of just at about the level of the bottom rollers, just about the same level as if fluid lube was used. This will normally require that about 1 1/2 - 2 pints of Mobilith SHC 007 be added during assembly. (Levels of 10%-70% full have worked satisfactory).

All parts should be lightly coated with grease to prevent corrosion from condensation.

Hub caps should have only a 5/8 inch "collar". No additional grease should be put into hubcaps. The vent should not be covered.

A reportedly easy way to assemble the units is to use a pressure packer to prepack the bearings, use a hand operated grease pump with a probe to pump 1 1/2 -2 pints of grease into the hub center before the outer bearing is installed. Then install the hubcap after lightly coating the inside of the hubcap and putting a 5/8 inch collar around the outer circumference (inside) of the hubcap.

Service need only be performed if leakage is evident upon inspection.

Questions, performance comments (good or bad), or suggestions should be directed to Bill Pratt at 1-800-662-4525 prompt #7.

Dick

R. C. (Dick) Morrow
Applications Engineer

Mobil

R. C. (DICK) MORROW
Sr. Staff Engineer

MOBIL OIL CORPORATION
3225 Gallows Road
Fairfax, Virginia 22037

(703) 849-3749

Mobil Oil Corporation

3225 GALLOWS ROAD
FAIRFAX, VIRGINIA 22037-0001

September 7, 1994

Mr. Charles E. Reagan
Manager, Heavy Duty Products
Freudenberg NOK
47690 East Anchor Court
Plymouth, MI 48170-2455

Dear Mr. Reagan:

Per the July 20, 1994, meeting held by CRST and concerning Mobilith SHC 007, the response from our technical department is attached for your review. Specifically, Paragraphs 5 and 6 address the recommended amount of grease that should be placed in the hub cap.

Should you have additional questions concerning this issue, please do not hesitate in contacting Mr. Bill Pratt at 1-800-662-4525, prompt #7, or myself at the number found below.

Sincerely,

W J Patterson

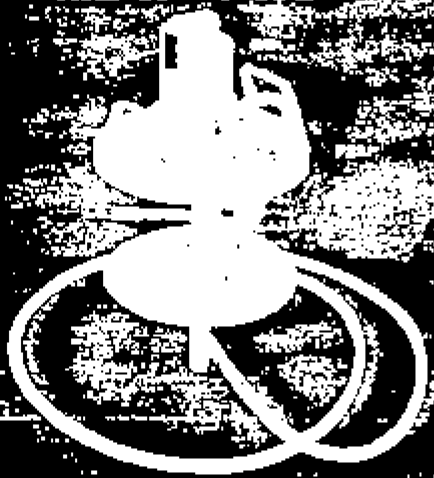
W. J. Patterson
National Account Manager - Midwest
National Accounts Sales Division
1-800-227-0707, Ext. 1526

Enclosure

cc: P. G. Millett

AIR OPERATED LUBRICATORS

Power-lube P2 (called MAXI-LUBE in USA and Canada) Maxi-lube P5



MODEL P2 DESIGNED TO FIT ORIGINAL REFINERY GREASE PAILS 25 lb-45 lb (12 kg-22 kg). MODEL P5 FITS 110 lb-120 lb (50 kg-55 kg) DRUMS.

Power-lube is portable, fast and simple to use. Booster gun can attain 10,000 psi (69 MPa) if required.

Sealed unit designed for field and most industrial applications. Virtually maintenance free.

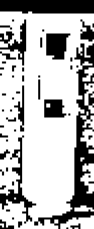
The ultimate tool for low cost, fast and efficient air powered greasing.

Features
- Pump ratio 50:1.
- Suits compressors from 3 cfm (0.08m³) and air pressure from 60-125 psi (400-860 kPa)
- Booster gun gives up to 10,000 psi greasing pressure.
- 13' (4 m) grease delivery hose and 360° swivel joint.
- Handles greases up to No. 2 consistency.
- Optional drum trolleys available
  TR5 suits Model P2/ TR6 suits Model P5

Model P5 shown complete with optional TR6 trolley

*Pressure regulator and quick release coupler supplied as standard equipment in USA and Canada — optional for other countries.

[illegible]



[illegible]

LEVERGUN K84
[illegible] capacity
Popular lever action model for high pressure greasing. 3-way filling — bulk, cartridge or J2 grease pump. High nozzle with coupler. Up to 7,500 psi (52 MPa) grease pressure. Fully serviceable.

[illegible]

MANUALLY OPERATED

Grease Pump

J2/J5 GREASE PUMP —

DESIGNED TO FIT ORIGINAL REFINERY GREASE PAILS 25 lb-45 lb (12 kg-22 kg). MODEL J5 FITS 110 lb-120 lb (50 kg-55 kg) DRUMS.

This portable filler pump complements the K8524 and K8567 Mini-lubes (page 2) and being fully sealed provides contamination-free grease transfer.

Features
- High volume output per stroke.
- Standard rubber-edged Follower Plate.
- Can be used to transfer other materials of a similar viscosity.
- May be used to reload grease guns fitted with a filler nipple.
- Optional drum trolley available.
  TR5 (as illustrated) suits Model J2.
  TR6 suits Model J5.

[illegible]

Accessory Kits

[illegible]