

From PS Magazine 32 Pg. 2-13:

BABY THOSE

STRAIGHT ROLLER BEARING

A ball or roller bearing is a carefully designed and finely built machine. Its parts are highly finished and accurately fitted to the last detail just like an expensive watch, but it's a rugged machine, built to take heavy loads. Your trucks, tanks, guns roll on these little gimmicks.

As rugged as it is, a small amount of dirt, or the wrong kind of handling, will cause it to fail and maybe result in serious damage to other parts.

Unfortunately—and strangely enough—the most natural thing a fella will do in handling a bearing is usually wrong. How many times have you seen a guy pull a bearing out of a job and start spinning it with his greasy dirty hands? Like a kid with a top.

Then he feels it and says it's "rough", and chucks it on the junk pile.

BALL BEARING

TAPERED ROLLER BEARING

NEEDLE ROLLER BEARING

DON'T SPIN BEARING BEFORE CLEANING, DIRT CAN CAUSE SERIOUS SCRATCHING.

DON'T DO THIS

2

BEARINGS



That bearing never got the benefit of the doubt. Who knows? Maybe a couple of pieces of dirt or cuttings fell into the bearing while the job was underway. In that case, the roughness was probably nothing more or less than a hunk of trash buried in the race.

Before you remove the bearing from a shaft or even turn it, wash the bearing in dry-cleaning solvent. Imbedded dirt is removed from the picture—the bearing gets a square deal.

Dirt in a bearing is poison. Never toss bearings on a dirty bench or floor, intending to clean them later. Or after cleaning—don't lay bearings aside uncovered, feeling that just because they were clean once they'll stay clean.

HOLD CLEAN BEARING LIKE THIS WHEN ROTATING OUTER RING DURING INSPECTION.

HOLD LIKE THIS



CLEANLINESS



WORK WITH CLEAN TOOLS IN CLEAN PLACE ON CLEAN BENCH



USE WOODEN MALLETS OR SOFT BRASS HAMMERS ONLY DIRECTLY ON SHAFT—NOT ON BEARING. NEVER USE DIRTY, BRITTLE, OR CHIPPED TOOLS.



KEEP HANDS CLEAN AND DRY. LAY BEARINGS ON CLEAN PAPER TO PROTECT FROM MOISTURE AND DIRT.



KEEP BEARINGS IN THEIR BOXES. BREAK BOX SEALS JUST BEFORE USING BEARINGS.



NEVER WASH OR WIPE OUT PROTECTIVE LUBE PUT IN BEARINGS BY MANUFACTURER. IF A BEARING MUST BE WIPED USE CLEAN LINT FREE WIPING CLOTHS. TREAT AN OLD BEARING WITH SAME CARE AS A NEW ONE.

MOUNTED BUT NOT ENCLOSED BEARINGS SHOULD BE COVERED WITH CLEAN CLOTH OR PAPER TO KEEP OUT DUST OR DIRT.



REMOVING BEARINGS

USE AS MUCH CARE REMOVING BEARINGS AS MOUNTING THEM. HERE'S SOME OF THE THINGS TO WATCH FOR.

1 CLEAN ALL OLD GREASE FROM THE BEARING AND SHAFT.

2 NEVER FORCE BEARING FROM SHAFT BY USING PRESSURE AGAINST OUTER RING OR FROM TIGHT FITTING HOUSING BY PRESSURE AGAINST THE INNER RING.

3 REMOVING A BEARING, PULL ONLY THE RING THAT'S TIGHT. REMOVE BEARINGS FROM SHAFTS BY PRESSURE ON INNER RING. THEY'RE REMOVED FROM HOUSING BY APPLYING PRESSURE TO THE OUTER RING.

4 PRESS OR PULL STRAIGHT AND SQUARE SO RING WON'T COCK. COCKING MIGHT SCORCH SHAFT OR HOUSING AND DAMAGE BEARING. NEVER PRESS OR PULL AGAINST BEARING SHIELD OR SEPARATOR.

5 NEVER APPLY PRESSURE TO A BEARING RACEWAY, ROLLER, BALL, BALL SEPARATOR OR SHAP RING.

6 IF YOU CAN'T GET GRIP ON CORRECT RING AND HAVE TO PRESS OR PULL ON OUTER RING, PULL JUST ENOUGH TO CLEAR THE TIGHT RING TO GRIP IT.

SCRATCHES AND NICKS ON BEARING SURFACES
SPELL "J.J.-N.-K. P.-L.-E."

CLEANING

SMALL TANKS AND WIRE BASKETS ARE BEST FOR SOAKING AND WASHING BEARINGS. IF YOU CAN'T GET EITHER OF THEM, USE A CLEAN GREASE OR OIL CAN FILLED WITH DRY-CLEANING SOLVENT.

HANG BEARING ON WIRE. KEEP IT OFF BOTTOM OF CONTAINER SO IT WON'T PICK UP DIRT. AFTER BEARING HAS SOAKED, SLOWLY TURN IT AROUND NEAR TOP OF CAN. RINSE IN CLEAN CONTAINER OF CLEAN SOLVENT.



1

IF GREASE IS HARD AND CAN'T BE REMOVED BY CLOSING AROUND, HEAT SOME #10 ENGINE OIL TO ABOUT 170° F AND SOAK BEARING IN IT. THIS'LL USUALLY DO THE JOB.



2

TOUGH DEPOSITS OF SLUDGE MAY CALL FOR CARBON TETRACHLORIDE. CARBON TET VAPORIZES FAST, LEAVING BONE DRY BEARING WIDE OPEN TO RUST. GET OIL ON BEARING RIGHT AFTER SUCH A CLEANING.



3

IF YOU HAVE NOTHING BETTER AT HAND, WRAP BEARINGS—ON SHAFTS OR UNATTACHED—in CLEAN NEWSPAPER UNTIL YOU'RE READY FOR THEM.



4

BEARINGS WITH SHIELDS OR SEALS ON BOTH SIDES SHOULD NOT BE WASHED. WIPE THEM OFF TO KEEP DIRT FROM WORKING INSIDE.

NEVER USE AIR HOSE TO BLOW OUT OLD GREASE OR SOLVENTS. THERE'S NO BETTER WAY TO SCRUB OR SCORE THE BALLS AND RACE THAN BY SPINNING A DRY BEARING.



5

AFTER BEARINGS ARE CLEANED OF DIRT OR MOISTURE GIVE THEM A SQUIRT OF OIL BEFORE TURNING THEM IN YOUR HANDS TO CHECK FOR ROUGHNESS.



6

INSPECTION

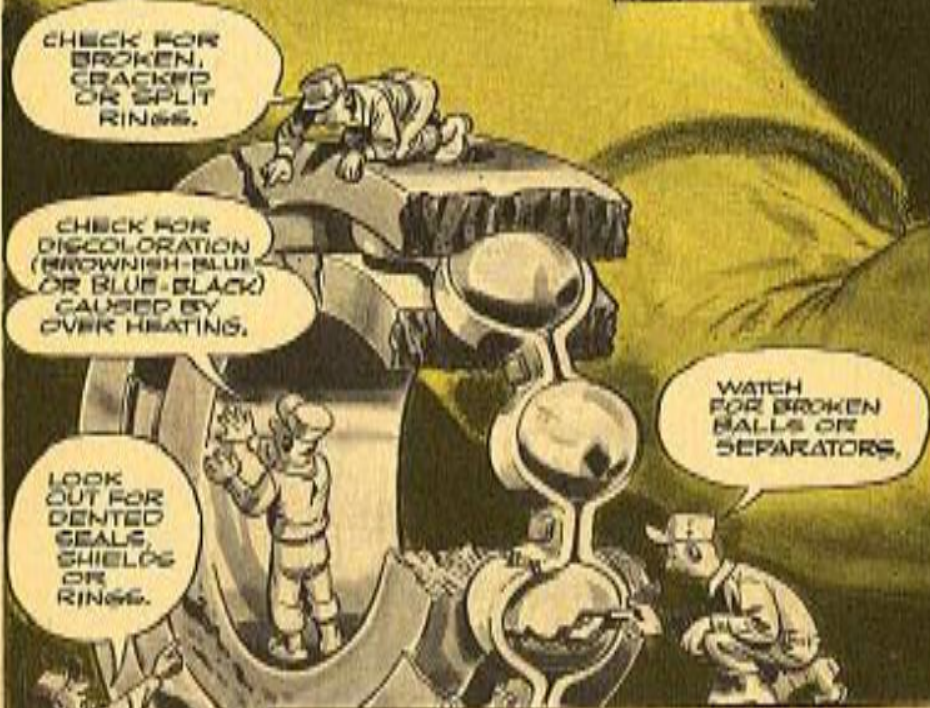
After a bearing is washed clean, you've got to inspect it to find out if it's good enough to be used.

So much depends on "feel" when judging a bearing that some fellas squirm while deciding. But a little study and reason makes every man his own expert.



SPIN LIKE THIS

WHEN THE OUTER RING IS SPUN, IF IT'S GOT DIRT OR GRIT, IT WON'T COAST TO A STOP, BUT STOP FAST LIKE. CLEAN IT AND CHECK AGAIN.



CHECK FOR BROKEN, CRACKED OR SPLIT RINGS.

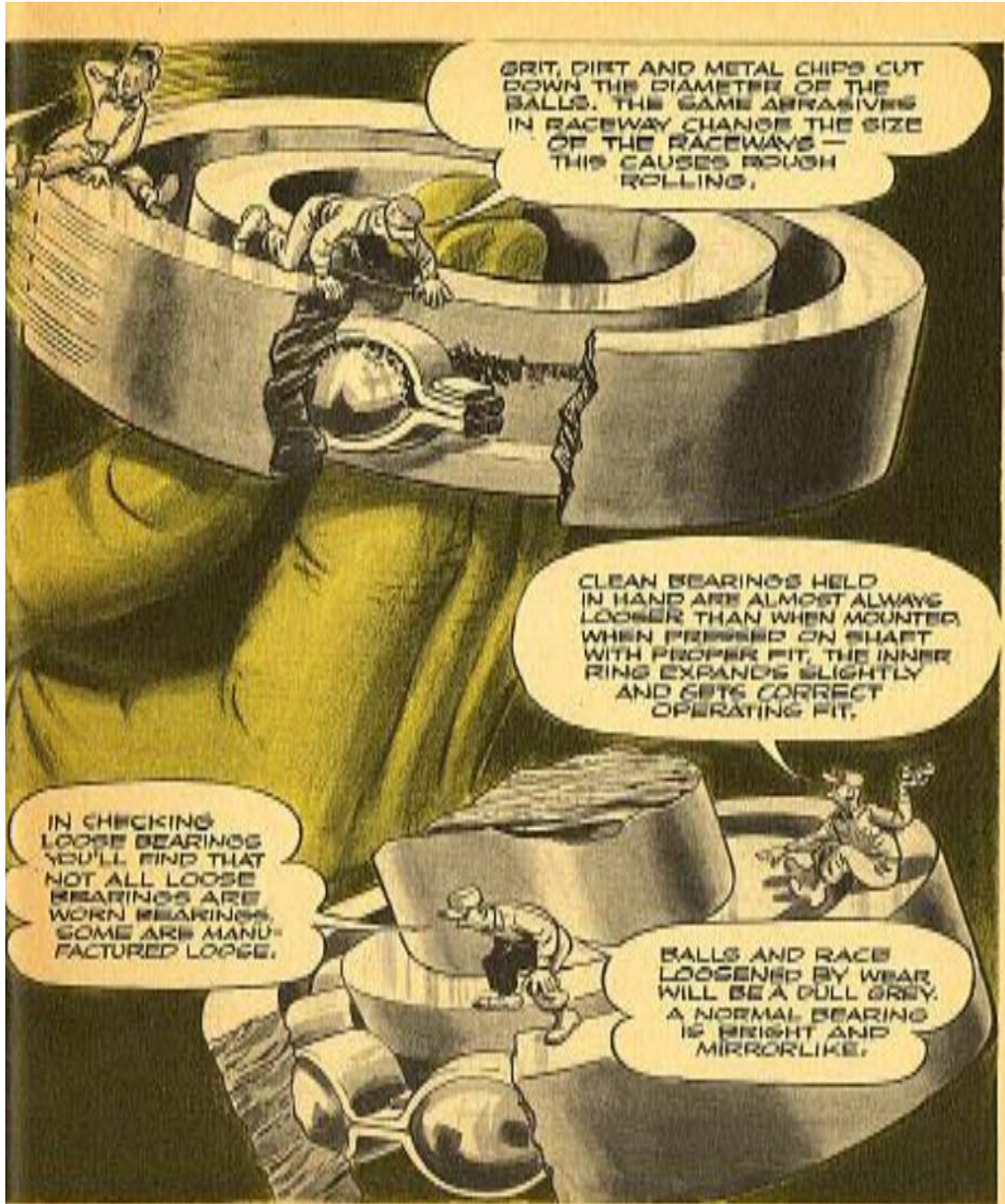
CHECK FOR DISCOLORATION (BROWNISH-BLUE OR BLUE-BLACK) CAUSED BY OVER HEATING.

LOOK OUT FOR DENTED SEALS, SHIELDS OR RINGS.

WATCH FOR BROKEN BALLS OR SEPARATORS.

ON ROLLER BEARINGS CHECK:





GRIT, DIRT AND METAL CHIPS CUT DOWN THE DIAMETER OF THE BALLS. THE SAME ABRASIVES IN RACEWAY CHANGE THE SIZE OF THE RACEWAYS — THIS CAUSES ROUGH ROLLING.

CLEAN BEARINGS HELD IN HAND ARE ALMOST ALWAYS LOOSER THAN WHEN MOUNTED. WHEN FORCED ON SHAFT WITH PROPER FIT, THE INNER RING EXPANDS SLIGHTLY AND GETS CORRECT OPERATING FIT.

IN CHECKING LOOSE BEARINGS YOU'LL FIND THAT NOT ALL LOOSE BEARINGS ARE WORN BEARINGS. SOME ARE MANUFACTURED LOOSE.

BALLS AND RACE LOOSENED BY WEAR WILL BE A DULL GREY. A NORMAL BEARING IS BRIGHT AND MIRRORLIKE.

LUBRICATION

KEEP YOUR LUBRICANTS IN CLEAN AND COVERED CONTAINERS.



CHECK A NEW BEARING. SOME ARE SHIPPED WITH ONLY ENOUGH GREASE TO PREVENT RUST.



LUBE BEARINGS ACCORDING TO INSTRUCTIONS IN TECH MANUAL OR LUBE ORDER COVERING EQUIPMENT ON WHICH YOU'RE WORKING. USE ONLY WHAT LUBE INSTRUCTIONS CALL FOR.

AVOID OVERLUBING

WHEN PACKING A BEARING WITH GREASE GET GREASE BETWEEN BALLS OR ROLLERS BY KNEADING INTO ALL OPEN SPACES WITH THE HAND.

OVERFILLED BEARINGS AND BEARING HOUSINGS MEAN TROUBLE. GREASE OR OIL WILL OZZE OUT, COLLECT DIRT, AND CAUSE TROUBLE.



BEARINGS ARE LUBRICATED TO PROTECT THEIR HIGHLY FINISHED PARTS FROM CORROSION OR RUST.



LUBE REDUCES TEMPERATURE



KEEPS OUT WATER, ACID, SCALE AND ABRASIVE.



IN EXTREMELY COLD WEATHER USE LUBRICANT CALLED F68. IF YOU DON'T HAVE LUBRICANT WITH A LOW POUR OR CHANNELING POINT, GEARS AS WELL AS BEARINGS WILL FORM A CHANNEL THROUGH THE LUBRICANT, RUN DRY AND SOON BURN UP.

TOO MUCH GREASE ON A BEARING CAN FORM A WAVE AHEAD OF BEARING AS IT IS PRESSED INTO PLACE AND PREVENT SOLID CONTACT AGAINST A SHAFT SHOULDER OR SEAT.

INSTALLING A BEARING

INSTALLATION OF A BEARING IS JUST THE REVERSE OF REMOVING ONE, BUT IN ADDITION HERE'RE SOME HELPFUL HINTS.

SHAFT MUST BE CLEAN BEFORE BEARINGS ARE MOUNTED, DIRT TRAPPED BETWEEN BEARING FACE AND SHAFT SHOULDER CAN KEEP BEARING FROM SEATING PROPERLY.



FORCING A COCKED BEARING INTO PLACE MAY RESULT IN SCRAPE AND DAMAGE TO BEARING SEAT.



INSTALLING BEARINGS IN DAMAGED HOUSINGS OR ON DAMAGED SHAFTS OR SPINDLES IS WASTED TIME - AND BEARINGS.

DON'T ALLOW AIR HOSE AROUND WHILE BEARINGS ARE BEING INSTALLED, EVEN IF BEARINGS ARE COVERED WITH CLOTH OR PAPER. FINE PARTICLES BLOWN INTO AIR CAN GET INTO BEARINGS.



DRIFT PINS FOR LOCATING AND SQUARING UP BEARINGS SHOULD BE OF UNHARDENED DRILL ROD OR COLD ROLLED STOCK WITH EDGES WELL ROUNDED. HARDENED DRIFT PIN WILL DAMAGE RING SURFACES. COPPER OR BRASS MIGHT FLAKE AND GET INTO BEARINGS.



NEVER HAMMER DIRECTLY AGAINST RING. YOU'LL DAMAGE BEARING AND SPLINTERS FROM BEARING RING COULD INJURE EYES OR FACE. USING HAMMER ON SEAL OR SHIELD WILL LOOSEN SEAL OR SHIELD.



STORAGE

Bearing manufacturers take the strictest care at all times to keep dirt of any kind from getting into bearings. They have oil filtering systems, dust free rooms. They lube and box them immediately so's they're perfectly clean when you get them. You should use precautionary measures in the stock room, too.

Bearings should be kept in a stock room that doesn't get too hot and where there isn't too much moisture. In a stock room that is humid or damp the possibility of rusting is great. When kept in too warm a place, the lubricant coating the bearings can become fluid and work away from some of the surfaces. That way they're really open to rust when it's damp.

WHEN BEARINGS ARRIVE FOR STOCK THE INDIVIDUAL BOXES IN WHICH THEY'RE SEALED SHOULDN'T BE OPENED. STACK THE BOXES CAREFULLY . . . TOO HIGH . . . AND YOU'LL CRUSH THE LOWER BOXES.

BEARINGS IN OPENED OR BROKEN BOXES SHOULD BE CHECKED. IF DIRTY, DON'T SPIN THEM, BUT CLEAN AND RELUBRICATE. THEN PUT THEM IN STOCK.



IF YOU REMOVE CELLOPHANE OR OILED PAPER WRAPPERS FROM BEARING AND DON'T USE BEARING, PUT IT BACK INTO WRAPPING BEFORE RETURNING IT TO BOX.



IF A BEARING IS PUT IN BOX WITHOUT THAT WRAPPING, THE LUBRICANT WILL SOAK INTO BOXES AND BEARINGS WILL DRY OUT AND RUST.





Also From PS Magazine 144 Pg. 2- 12:

AN ARMY SCOOTS ON ITS...

TO KEEP
YOUR EQUIPMENT
SCOOTIN', ALL ANTI-
FRICTION BEARINGS
MUST BE KEPT
ROUND
FIRM AND FULLY
PACKED...AND
GIVEN TENDER
LOVING CARE.

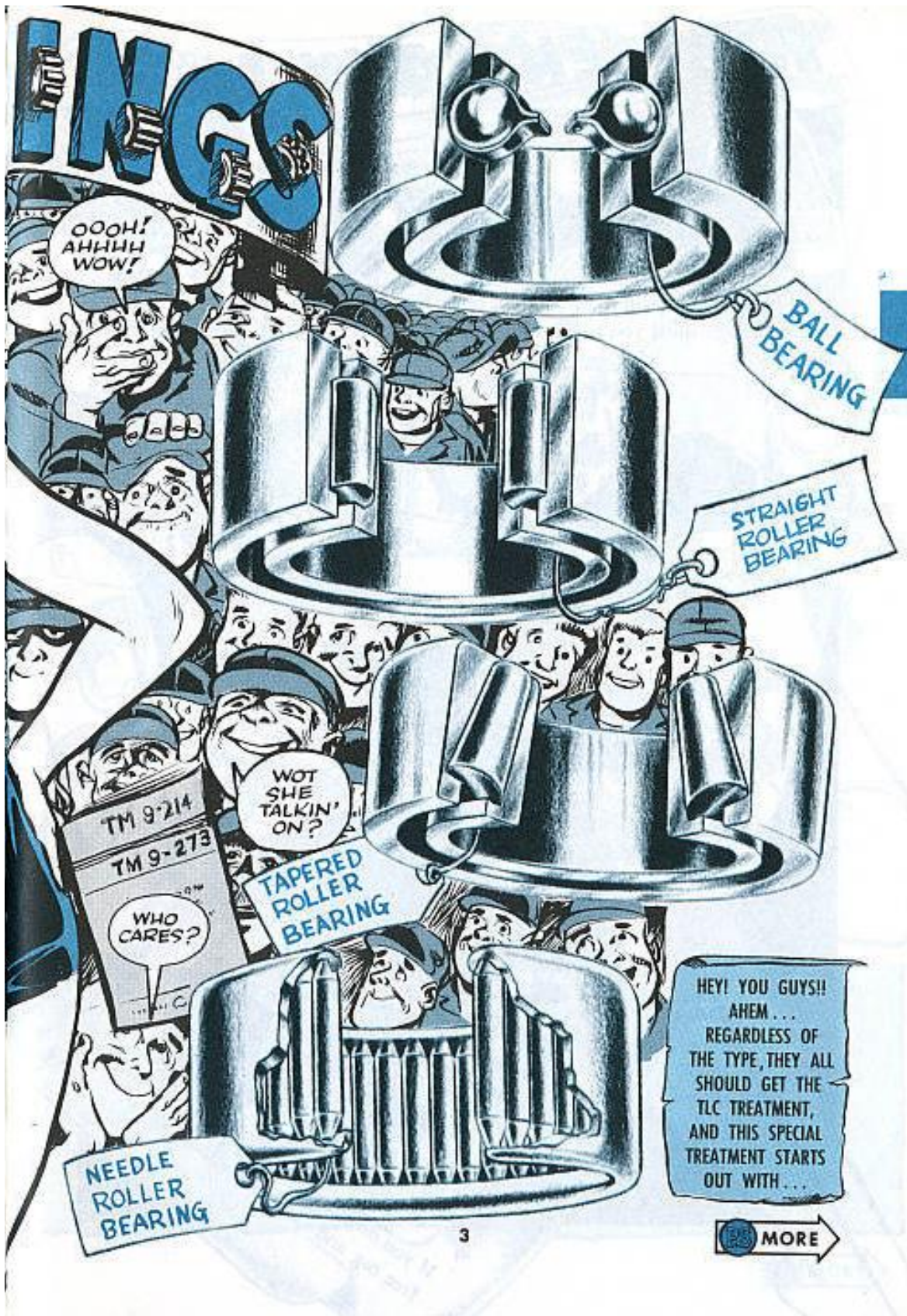
Bearings are made and put together with the greatest of care. Because of their highly-polished surfaces and close tolerance, they need and deserve the best you can give 'em.

Because they can move mighty loads they are often misunderstood. Like gems, they're rugged and also like gems they should be given tender lovin' care.

You heard the one about "the wheel that squeaks gets the grease." Well, if that happens to a wheel that rolls on a bearing, it's too late for grease. Chances are that squeak is the bearing's death chant.

A little dirt, sand, rust, rough handling or misadjustment can send a bearing on its last mile. And usually your truck, tank, gun or what-ever-you-have that rolls on that bearing goes with it.

BEAR



INGG

OOOH!
AHHHH
WOW!

BALL
BEARING

STRAIGHT
ROLLER
BEARING

TM 9-214
TM 9-273

WHO
CARES?

WOT
SHE
TALKIN'
ON?

TAPERED
ROLLER
BEARING

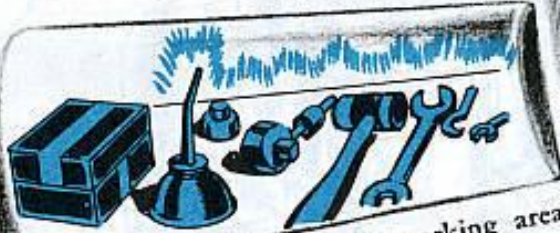
NEEDLE
ROLLER
BEARING

HEY! YOU GUYS!!
AHM...
REGARDLESS OF
THE TYPE, THEY ALL
SHOULD GET THE
TLC TREATMENT,
AND THIS SPECIAL
TREATMENT STARTS
OUT WITH...

KEEP 'EM CLEAN



Keep bearings in their original box or sealed package until you're ready to use 'em.



Keep your work bench or working area clean—use clean tools.



Always lay bearings on clean paper or a clean rag to protect them from moisture and dirt.



Cover the bearing when it's not inclosed in a housing or its package. Never let it around uncovered.



If you must wipe a bearing use a clean, lint-free rag and clean solvents.

THIS IS A-NO.1 IN THE TREATMENT BECAUSE **DIRT** IS A BEARING KILLER! SO...FIRST OFF...KEEP YOUR HANDS CLEAN AND DRY!



**HANDLE
WITH
CARE**

DON'T
EVER ROUGH
'EM UP,
'CAUSE IT
TAKES JUST
A WEE BIT
TO RUIN A
BEARING.



1. Never spin a dirty bearing or a dry one with compressed air.
2. Using abrasive material like emery cloth or steel wool is out.
3. Using wooden drifts or mallets on the bearing itself is also taboo. Splinters could get into the bearing.

4. Keep your fingerprints off—handle a clean bearing with a clean lint-free cloth or by its inner race. Remove all fingerprints before installing.
5. Treat old bearings just like you do new ones.
6. Never use dirty, brittle or chipped tools.

TO REMOVE BEARINGS ●●●

Clean all oil or grease from around the bearing, shaft and housing.

Check your special and common tool sets for a bearing puller that can do the work.

Press or pull only on the race that is tight.

Remove press-fitted bearings from shafts by force applied to the inner race.

"Top fits" in housings are removed with pressure applied to the outer race.

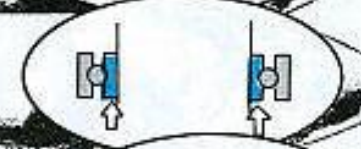
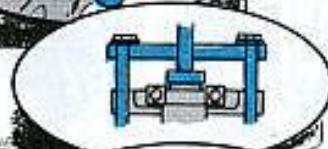
Press or pull straight and square. This'll keep from cocking the bearing. A cocked bearing can score the shaft or housing or damage the bearing.

The bearing's shield or separator is tender—never pull or press against 'em. That also goes for the raceway and snap ring.

On tight bearings, where you can't get a grip on the correct ring, pull or press on the other one just enough to get a grip on the tight ring.

When using a drift, make sure it's mild steel. But a soft metal hammer or drift is OK when hammering directly on the shaft. This way, you'll not mark the shaft.

Never hammer directly on the race, cage or roller assembly.



CLEANING SPECIAL

If it's a new bearing it doesn't need cleaning. You never remove grease or oil from a new bearing.

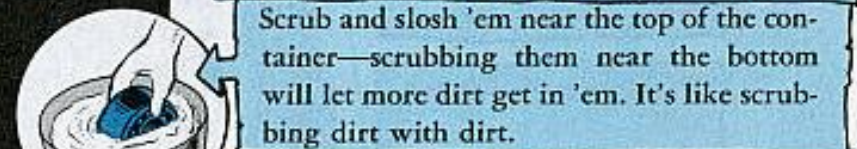
Never use a high-pressure air hose to blow out grease and dirt.

Wash 'em in either of these solutions. And be real careful because all these liquids are highly flammable:

Mineral Spirits	FSN 8010-290-6113	1 gal	Dry-Cleaning	FSN 6850-281-1985	1 gal
(Paint Thinner)	FSN 8010-558-7026	5 gal	Solvent	FSN 6850-264-9038	5 gal
	FSN 8010-246-6115	55 gal		FSN 6850-264-9037	55 gal



Use two washes—one for initial cleaning and another for the final rinse.

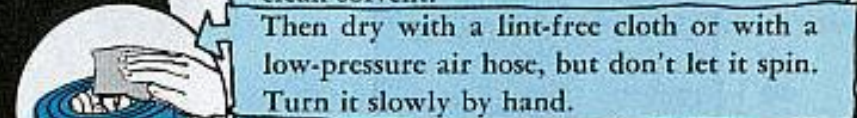


Scrub and slosh 'em near the top of the container—scrubbing them near the bottom will let more dirt get in 'em. It's like scrubbing dirt with dirt.

Or you can let it hang in the solvent until grease and dirt are soft.



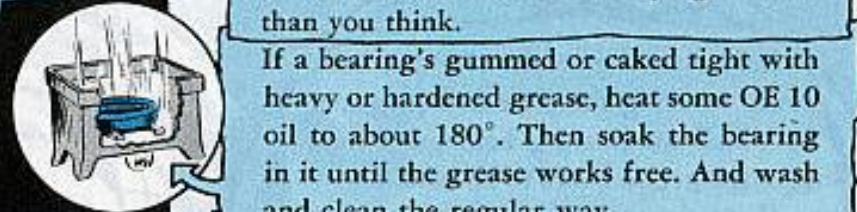
After first cleaning, rewash and rinse in clean solvent.



Then dry with a lint-free cloth or with a low-pressure air hose, but don't let it spin. Turn it slowly by hand.



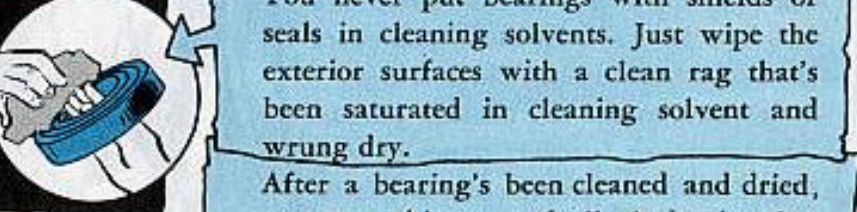
Or lay 'em on a clean piece of cloth or paper away from dirt and moisture. Keep 'em covered; there's more dirt flying around than you think.



If a bearing's gummed or caked tight with heavy or hardened grease, heat some OE 10 oil to about 180°. Then soak the bearing in it until the grease works free. And wash and clean the regular way.



You never put bearings with shields or seals in cleaning solvents. Just wipe the exterior surfaces with a clean rag that's been saturated in cleaning solvent and wrung dry.



After a bearing's been cleaned and dried, put on a thin coat of oil. A dry bearing can rust fast.



After a good cleaning your next important treatment is inspection. So . . .

Inspecting a bearing may seem tough, but it is not. Just look it over real careful like for any defect that'll put it in the "unserviceable" class.

Spin the bearing by hand (no air hose here). It should spin freely without any drag or binding and coast to a stop.

Listen for excessive noise or any vibration while spinning it by hand. Look it over real close for these defects:

Rings—broken, cracked, split.

Shields or seals—dented, split.

Bearings, (balls or roller) and raceways—flaked areas, rust, deep cuts or scratches, flat spots, pitted, overheated (brownish-blue or blue-black color), broken, showing wear marks.

**LOOK
'EM
OVER!**



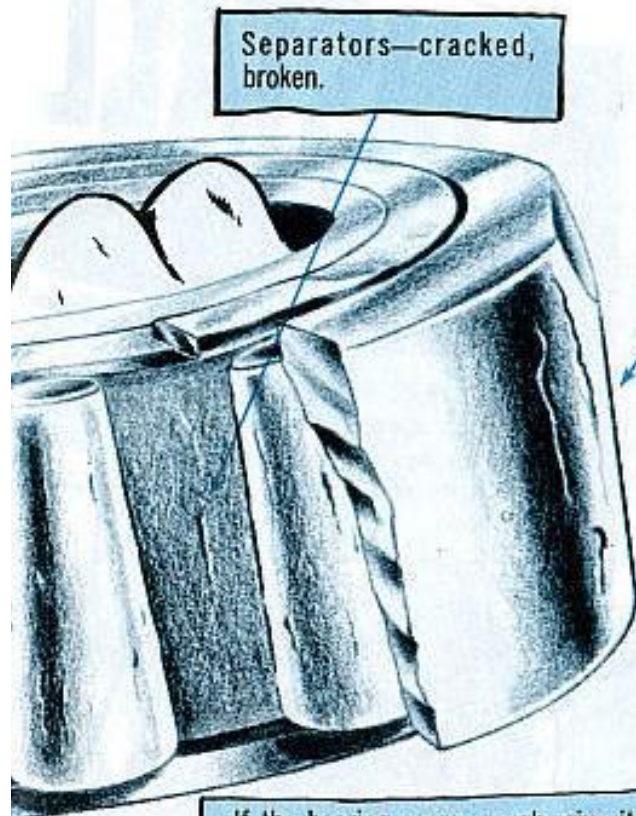
NOW! THE BEARING IS READY FOR LUBING.

Before lubing, look over the lube order covering the piece of equipment in which the bearing belongs. This'll give the grease that's to be used.

If you're to use GAA, use only Amendment 2 or 3 as SB 725-9150-1 (31 Mar 58) says. In short, you never use GAA Amendment 1 in bearings.

It's best to use the bearing packer. The lubricator (packer) comes in your Organizational Common tool set as part of the Lubricating Kit.





Separators—cracked, broken.

Cup and Cone—deep cuts or scratches, flat spots, wear bands. If any one needs changing, replace 'em as a set.

General condition—Too loose (careful here; clean and unmounted bearings are normally loose), rust on critical surfaces, wear bands on any parts, signs of brinelling. Tapered roller bearing cone etched by acid or moisture. Worn (Normal—mirror bright; Worn—dull gray).

If the bearing seems rough, give it another cleaning. It may still have a little hidden dirt.

After you've inspected it and it's a good one, take off all fingerprints with:

Fingerprint Remover, Corrosion preventive:

FSN 8030-664-4017... 1 qt

FSN 8030-281-2338... 1 gal

FSN 8030-252-8300... 5 gal

Then give it a dip in clean paint thinner or dry-cleaning solvent.

IF YOU'RE GOING TO PACK IT BY HAND, WASH YOUR HANDS REAL WELL, THEN COAT 'EM WITH GAA OR THE GREASE YOU'RE GOING TO USE.



Use only clean and fresh grease. Knead the grease into the bearing until it squishes out the other side. Not too much; use just enough to pack the

rollers or balls and a thin coat over the rings.

Keep the bearing covered until it's to be installed.

Before installing a clean and lubed bearing make certain the housing in which it's to go is clean. Clean out all rust and rust flakes; repaint the interior if necessary.

On wheel hubs, after they're clean, smear a thin (1/16 inch) coat of GAA in 'em, just enough to keep 'em from rusting. Don't pack hubs; too much grease melts and seeps out . . . and it'll run into your brakes.

Remember how careful you were when you cleaned the bearing? Well, when installing it you have to be twice as careful. It can be damaged seriously by wrong installation.

INSTALL

Clean all shafts. When pressing a bearing on a shaft, any dirt left will move ahead as the bearing's pressed forward and pack between the inner race. This'll cause wrong adjustment.

Drive the bearing in (housing or shaft) evenly and squarely. Don't cock the bearing.

Never drive it by hitting the bearing directly against the rings.

Use drift pins made of unhardened steel and with round edges to square 'em up while mounting. Stay away from soft metals like brass and copper. They'll chip . . . a chip in a bearing leads to trouble.

Never force a cocked bearing.

The best mounting job is done by using drive blocks. They can be made locally and are nice to have when the operation is repeated often.

DON'T
COCK
BEARING.



WITH CARE

THE NEXT STEP IS ALSO MIGHTY IMPORTANT-- IT'S ADJUSTING.

CLEAN SHAFT REAL GOOD BEFORE MOUNTING BEARING.

If a bearing's too tight it'll heat up and maybe fail. If it's too loose it'll cause pounding. In the front wheels, it can crack the spindle, cause shimmy, make the truck hard to steer or cause extra tire wear. Play it safe and adjust all bearings just like it says in your equipment's technical manual.

STORAGE

NOW, IF YOU NEED MORE BEARING INFO, DIG INTO TM 9-214 (NOV 59) AND TM 9-273 (JAN 62). MANY OUTFITS NEVER RECEIVED THEM VIA THEIR REGULAR TM DISTRIBUTION. IF YOU NEED 'EM, GET THEM ON A DA FORM 17 AND USE AR 310-1 PARA 63 AS YOUR AUTHORIZATION.

...THIS LETS YOU HAVE A NEEDED PUBLICATION ON A NEED-TO-KNOW BASIS... NOW, HERE IS SOME KNOW-HOW ON STORING BEARINGS.

1. Store bearings in sealed packages . . . and in a place that's away from dust and free from a lot of heat or moisture.

2. Open bearing packages only when they're to be used. If a package is opened, seal it before putting it back on the shelf.

3. Never take off the preservative coating of a new bearing. If you do, then it's got to be cleaned, lubed and the package resealed.

4. Never take 'em apart. The rollers and races are correctly matched and assembled at the factory.

5. Stack your bearings just so high. Too much weight will crush the lower boxes, break their seals and let dirt get in.

6. Stack 'em so older bearings are used first. This'll keep some from being around too long and maybe getting a case of rust.

7. If you must rewrap a bearing, keep it away from excelsior or other similar type packing material.

8. Keep all identification marks on a bearing package legible. Put all markings and FSN on a repackaged bearing.

