SUMMER 1972

NYE lubeletter

from: WILLIAM F. NYE, INC., P.O. Box G-927, New Bedford, Mass.

ANNOUNCING:

A HYDROCARBON - BASED INSTRUMENT OIL FOR WIDE TEMPERATURES

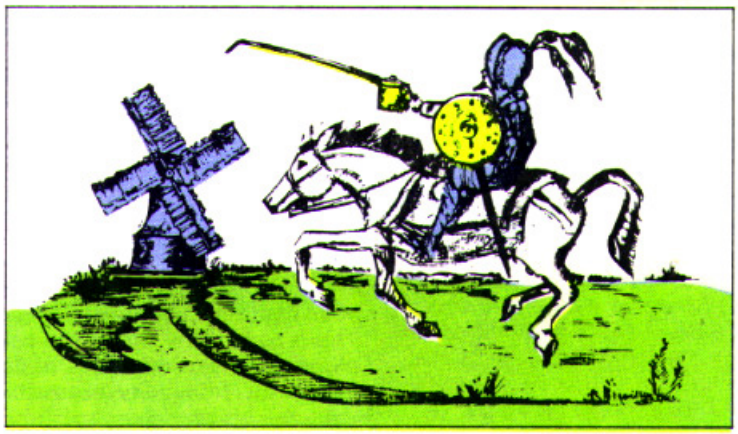
NYE'S 132C OIL PROVIDES PLASTIC COMPATIBILITY AND PARAFFING FILM STRENGTH FOR -65° F. TO +250° F. NEEDS.

For the first time since development of polyol esters and chlorinated silicones, an entirely new base oil system is now available for formulation of wide temperature instrument oils. The new synthetic hydrocarbon fluids have offered us a range of intriguing possibilities for special lubricant formulation; and, in the new Nye Synthetic Instrument Oil 132C, Nye has prepared a hydrocarbon-based instrument oil for -65°F. to +250°F. uses which does not attack such ester-vulnerable plastics as polycarbonates, a-b-s resins, polysulfones and polyphenylene oxides. This oil is being promoted as an alternative to the MIL-L-6085A-type diester-based instrument oils.

Synthetic lubricants have come full circle in the synthetic hydrocarbons; light petroleum fractions are polymerized to form iso-paraffins - straight chain hydrocarbons with multiple branchings and carbon-carbon linkages. The branching permits exceptionally low pour points for hydrocarbons while maintaining excellent volatility and viscosity-temperature characteristics. We haven't quite reached the MIL-L-6085A -65°F. viscosity requirement of 12,000 centistokes; however, the 132 C Oil is below 16,000 centistokes at this temperature, and work is proceeding with a target of 13,000 centistokes, the requirement put forward in the Navy's new prototype specification to succeed MIL-L-6085A.

Of special interest is the fact that, in the Shell 4-Ball Wear Test, these synthetic paraffins, without additives, give wear scars an order of magnitude lower than un-fortified esters. Only when esters are fortified with complex additives are comparable results obtained.

The 132C Oil has already found application in t[illegible]ning and camera mechanisms. For data and a sample, check Item 1 on the Response Coupon, page 3.



"FLUORO - DIVERSITY" – UNUSUAL APPLICATIONS FOR THE FLUOROCARBON GREASES

In the two years since they were first produced, some unusual applications have been developed for the Nye Fluorocarbon greases. This family of greases consists of a variety of synthetic oils gelled with telomers of polytetrafluoroethylene. Do the following examples suggest any possibilities for your special needs?

810	Polyphenyl ether	Damping grease for small cam-operated switch
812	Polyol ester	Ordnance timing mechanism for -65° use
813	Chlorinated silicone	Wide-temperature potentiometer wiper contacts
816	Synthetic hydrocarbon	Movie camera gearworks; timing motor geartrain
823	Hi-viscosity phenyl silicone	Sealant for switch mechanism; damping grease for potentiometer shaft
828	Super-refined hydrocarbons	Stem grease for watches
843	Methyl silicone	Damping grease for ordnance fuze mechanism
860	Chlorofluorocarbon	Valve mechanism for anesthesia apparatus

For a bulletin on the Fluorocarbon greases, check Item 3 on the Response Coupon, Page 3.

WHAT OIL FOR WHAT TEMPERATURE?

The first question we consider in preparing a lubricant recommendation is temperature. Our customers confront increasingly severe temperature extremes, both on the low side and the high, and we thought you would be interested in the following quick guide to the alternatives when temperature extremes are encountered. Keep in mind that this list is not based on short-term temperature excursions or (on the cold side)-storage conditions, but operating temperatures over an extended period of time.

Colder Temperatures	
Below -100° F.	Solid films, especially fluorocarbons.
-70° F. to -100° F.	Silicones, including chlorinated or phenylated
-40° F. to -70° F.	Esters and specially-refined hydrocarbons
0° F. to -40° F.	Esters or special petroleum oils
Normal Temperatures	
0° F. to 200° F.	Petroleum oils or polyglycols
High Temperatures	
200° F. to 300° F.	Esters or synthetic hydrocarbons
300° F. to 400° F.	Polyol esters, fluorosilicones or silicones
400° F. to 550° F.	Silicones, polyphenyl ethers or perfluoroalkyl-polyethers
Over 550° F.	Solid film materials, including M_oS_2

Right now we are concentrating on development of new oils and greases for -40° F. to +400° F. operation. If you have needs in this range, please check Item 2 on the page 3 Response Coupon and we will send our latest recommendations.

OIL CREEP CORNER

BARRIER FILM DEVELOPMENTS

FLUORESCENT DYES One of the toughest problems associated with use of the barrier film materials has been the identification of treated parts - did this bearing get treated or not? Use of a dye coloring isn't too effective; the film as normally applied is so thin that, in traditional concentrations, the dye color doesn't show up very well; and, if larger dye concentrations are used, concern would arise about the effect of the dye on the surface energy of the film. We understand that the Navy is now experimenting with use in the MIL-B-81744(AS) barrier films of a fluorescent dye which, even in very small proportions, is readily apparent under black light. Prospects are that approval will be given so that future batches of NyeBar - Type C will eventually contain such a tracer.

PROBLEM-SOLVING WITH NYEBAR FILMS

The NyeBar films won't repeal the law of gravity; there is a limit to the amount of oil restrained by these products. Also, centrifugal force on high speed shafts can sling oil across the film. In view of such limitations, people often ask us how useful are the barrier films. We respond by listing a few of the varied applications where they have solved problems.

1. Fiber clutch in an electric typewriter to prevent oil creeping from motor bearing onto clutch face and causing slippage.
2. Microscope slides to restrict liquid samples within a field of view.
3. Plastic cam actuating an appliance switch to prevent silicone contamination from nearby timer motor.
4. Stationary shaft of the secondary sheave in an elevator apparatus to control oil loss.

PLASTIC - COMPATIBLE SOLVENT

The solvent for NyeBar - Type H has always been 1,1,1-trichlorethane, an active solvent to which many plastics are vulnerable. Several applications have developed where oil creep protection is needed for plastic components, and we can now provide the Type H active film material in isopropanol under the label NyeBar - Type K. This is a flammable solvent, of course, but if you can handle that aspect of its use and would like a sample to try where oil creep onto plastics is a worry, check Item 4 on the Response Coupon on the next page.

THIN FILM STABILITY

USING POLYOL ESTERS AS BASE FLUID, NYE SYNTHETIC OIL 220 OFFERS IMPROVED HIGH TEMPERATURE PERFORMANCE FOR BALL BEARING APPLICATIONS.

For several decades the organic diesters have served as base fluids for synthetic wide temperature aircraft instrument oils, typified by Military Specification MIL-L-6085A. The upper temperature limit for these diester oils, when properly stabilized with good antioxidants, is approximately 300° F. for short periods or 250° F. for more extended bulk exposure. Where thin film exposure is involved, however, both oxidation stability and evaporation limit their usefulness even at 250° F. This is particularly true in ball bearing applications where thin films of the lubricants are continuously exposed.

The Naval Research Laboratory has recently proposed a successor specification to MIL-L-6085A which, through use of the more complex polyol esters describes a much more rugged ester-based instrument oil especially for uses cycling into the 300° F. area. This requires a small compromise with -65° F. viscosity, involving an increase from 12,000 to 13,000 centistokes in the permitted viscosity at this temperature. A 72-hour oxidation stability test at 350° F., along with a new thin film stability test, are proposed in the suggested new specification.

Nye now has a polyol-ester-based instrument oil designed around this proposed new specification, our Nye Synthetic Oil 220. Anyone operating at the grim edge of MIL-L-6085A capabilities is invited to check Item 5 on the Response Coupon below for a bulletin and sample of the 220 Oil.

"HEAVY HYDROGEN" IMPROVES LUBE STABILITY

By removing the hydrogen atoms in a paraffinic lubricating oil molecule and replacing them with deuterium (or "heavy hydrogen"), a startling and significant improvement in oxidation stability can be achieved. The carbon-deuterium bond is apparently considerably stronger than the carbon-hydrogen bond and there may also be some shielding of the residual carbon-carbon bonds.

We have been working with a Canadian isotope laboratory which has some patented expertise in this very difficult type of chemical transformation; the limited amount of presently available test data, involving "deuteration" of a synthetic isoparaffin, is most impressive. We would be pleased to share this data with anyone who is as intrigued as we are. It displays the effects of replacing either 50% or 100% of the paraffin's hydrogen with deuterium.

Limited amounts of fluid are also available for test purposes, although the prodedure is presently quite costly, and the resulting oil has a price in the fine research chemical range. Volume production could of course, reduce this; and we welcome inquiries. For a summary of available data, check Item 6 on the Response Coupon on page 3.

FLEXIBILITIES IN "GREASE PLATING"

A NEW TWIST TO AN OLD TECHNIQUE

If you're worried about oil bleed from soft greases or, if the very bulk of the grease form limits grease usefulness to you in low-torque devices, a variation on the traditional technique of "grease-plating" may be of interest to you.

In "grease-plating" a grease is dissolved or slurried in a fast-evaporating solvent; the resulting liquid (or slurry) is brushed onto the component to be lubricated (dipping is equally effective), and when the solvent has flashed off, a thin grease film remains.

This technique is far from new; any aerosol grease dispenser accomplishes as much; however, we have lately been working with fluorocarbon-fortified greases, and we find that when grease plating is tried with such materials, the fluorocarbon appears to act as a stabilizer or secondary gelling agent, absorbing and regelling the small amounts of oil which always bleed from softer greases. The long-term tendency of many thin oil or grease films to "dry up" is more often due to slow surface creep of the oil (or oil portion of the grease) rather than to evaporation or oxidation. The presence of the fluorocarbon with an ability to stabilize bleeding oil should enhance the life of the lubricant film. At the same time, the oxidation stability of the fluorocarbon would tend to maintain the lubricity of any ultra-long-term oxidative degradation products from the oil.

If your application could use such a stable, self-healing lubricating film, check Item 7 on the Response Coupon (page 3). We can supply a variety of these developmental lubricants - NyeFilm 540 is based on a wide temperature diester grease; Nye Film 527 on an inorganically-gelled synthetic hydrocarbon fortified for use with aluminum metal.

DAMPING GREASES — A RANGE OF POSSIBILITIES

New varieties of synthetic oils coupled with new and improved gelling techniques have substantially increased the flexibility and capability of the special lubricants traditionally used to smooth the motion of optical instrument threads and focusing controls. These greases have been variously called damping greases, motion control compounds or thread sealants. They can be used in situations where precise settings of optical or electronic controls are obtained from hand-operated linkages or mechanisms.

In manufacture of these materials, oils are gelled to produce non-stringing, non-migrating greases. The most commonly used gelling agents have been special metal soaps, and where operating temperatures do not exceed 200° F., the resulting greases have proved most satisfactory. Exposure to higher temperatures would melt the soap, however, and undesirable crystallization can occur on cooling.

We have been working on several alternative methods of gelling the base oils, all involving "non-melting" gelling agents. These are principally inorganic materials which would mean that the grease's upper operating temperature limits would depend principally on the stability of the base oil. These gelling agents include specially-modified silicas, and for certain special needs, fluorocarbon polymers.

As far as base oils are concerned, silicone fluids offer the best possible relationship of viscosity to temperature among all available synthetic or natural lubricating fluids. They also have excellent stability against oxidation. However, silicones have one very serious drawback as damping greases, which derives from their low surface tension. They have an extraordinary ability to creep on a clean metal or glass surface, and even a minute degree of oil bleed from a silicone damping grease - or inadvertent contamination during application - can lead to a silicone film on optical glass components. Again because of these surface tension properties, once a silicone film is on a glass surface, it is impossible to remove it completely.

Other than silicones the principal base material available to tackify damping greases has been a series of synthetically-prepared polymeric hydrocarbons, among which the higher molecular weight chains reach great extremes of viscosity while remaining plastic at room temperatures. By blending these extremely viscous fractions with other selected lower viscosity oils, a great range of tackiness and high/low temperature capabilities can be achieved.

Up to a few years ago, truly wide temperature ranges, say from -40° F. or below to above 200° F. in non-silicone systems, required use of ester oils as "blending vehicles" and our NyoGel 793 grease is an excellent representative of this type of formulation, suitable for -40° F. to 200° F. needs.

The esters will attack many commonly used plastics, however; and, only in the last couple of years has a series of non-silicone, plastic-compatible wide temperature alternative fluids become available in the form of the "synthetic hydrocarbons". A majority of the newer Nye damping grease use these new oils as blending vehicles.

For more information and samples from our large collection of special damping greases, check Item 8 on the Response Coupon.

SUPER-CLEAN OIL SERVICE AVAILABLE

Should you need oils in "super-clean" condition, involving filtration to the 0.45 micron level, Nye can make them available on special order.

One of the more difficult elements in this service is provision of a clean container. No need to "super-filter" the oil unless the bottle is also super-dean. This problem has forced many fine oil users to depend on point-of-use- filtration.

We now keep on hand a good supply of 4-fluid ounce amber bottles which have been super-cleaned by careful flushing under clean room conditions with cleaning solvents purified to 0.2 micron levels. We would welcome inquiries from any companies where receipt of oil in super-clean condition would be useful.

RESPONSE COUPON

CUT ALONG THE ABOVE LINE AND MAIL IN YOUR COMPANY ENVELOPE TO:

WILLIAM F. NYE - P.O. BOX G-927, NEW BEDFORD, MASSACHUSETTS 02742 Tele. (617)996-6721

(Check Your Address On Reverse Of This Coupon For Correctness.)

SEND FOLLOWING INFORMATION OR SAMPLES:

	INFO	SAMPLE
ITEM NO. 1 – SYNTHETIC OIL 132C	☐	☐
ITEM NO. 2 – LUBES FOR -40° F. to +400°F.	☐	
ITEM NO. 3 – FLUOROCARBON GREASES	☐	
ITEM NO. 4 – NYEBAR - TYPE K	☐	☐
ITEM NO. 5 – SYNTHETIC OIL 220	☐	☐
ITEM NO. 6 – DEUTERATED OILS	☐	
ITEM NO. 7 – "GREASE PLATING"	☐	☐
ITEM NO. 8 – DAMPING GREASES	☐	☐
ITEM NO. 9 – NYETACT 510	☐	☐
ITEM NO.10 – LUBE RECOMMENDATION QUESTIONNAIRE CARD		☐

SPECIAL REQUESTS: _____

AN IMPROVED LUBRICANT AND TARNISH PREVENTIVE FOR STATIONARY SEPARABLE CONTACTS

NYETACT 510 OFFERS PROTECTION FOR PRINTED CIRCUIT CONTACT SURFACES WHICH MAY BE VULNERABLE TO AIR POLLUTANTS

A major computer manufacturer has tested our NyeTact 510 and found significantly improved reliability compared with commonly-used protective lubricants for the "fingers" on printed circuit boards. This is a very different kind of lubrication requirement than found in moving contacts, as in a potentiometer. "Stationary separable" contacts or connectors move only on insertion or withdrawal; yet, with low voltages, high contact loadings are necessary to assure breakthrough of insulating films, and a good lubricant is essential to minimize insertion and withdrawal forces and to prevent wear or damage in doing so. Equally important is the protective quality of the lubricant in reducing tarnish formation.

Vaseline or light mineral oils, sometimes mixed with paraffin wax, are traditional lubricants for stationary separable contacts. Our new NyeTact 510 uses a high viscosity super-refined paraffinic oil stabilized with a special binder applied from a solvent solution to produce a thin, non-migrating, yet self-healing protective film with excellent lubricating properties. Oxidation stability is many times better than with traditional materials and we recommend its evaluation wherever increasing air pollution threatens reliability of connectors or printed circuit contacts. For a small sample, check Item 9 on the Response Coupon on page 3.

CUSTOM LUBRICANTS – FOR SPECIAL PROBLEMS

A large proportion of our company's sales are represented by oils and greases not listed in our Summary Catalog. They are special materials formulated to meet specific problem applications put to us by our customers. Among the recent additions to this list are -

(1) a water-soluble oil for combined washing and re-lubricating of copying machines on a mass-production basis

(2) a semi-fluid grease with superior oxidation stability for an electric toothbrush manufacturer

(3) an optical instrument grease for use with aluminum threads which has to be useful at -40° F.

(4) a crankcase lubricant for a new design of steam engine

(5) a protective coating and lubricant for the screw threads on light bulbs

(6) a damping grease for an ordnance time fuze application required to operate at -65° F.

(7) a rust-preventing, non-migrating oil for lubrication of seat belt retractor springs with usefulness to -20° F.

If you are working on a problem that might call for an off-beat solution, check Item 10 on the Response Coupon below and we'll send one of our Lubricant Recommendation Questionaire Cards. We'd appreciate the opportunity to make a recommendation for you.

from: WILLIAM F. NYE, INC.
P. O. BOX G-927
NEW BEDFORD
MASSACHUSETTS 02742

Introducing the NYE *Lubeletter*

CAPSULE REPORTS ON

NEW DEVELOPMENTS IN

SPECIALTY LUBRICANTS