CP Rail
Internal Correspondence

Date VANCOUVER, January 3, 1979. VV-604

From A.N. Cairns

To Master
"Carrier Princess"

Reference OPORD #79-22, 4 December 1979.

With the exception of the Master, crew change your vessel will now take place at midnight Saturday each week, as opposed to Sunday midnight.

A recent review of traffic quantities indicates the 1630 sailing Saturday will not normally be required, and it can be assumed for the present that the 1200 Sunday sailing will be necessary.

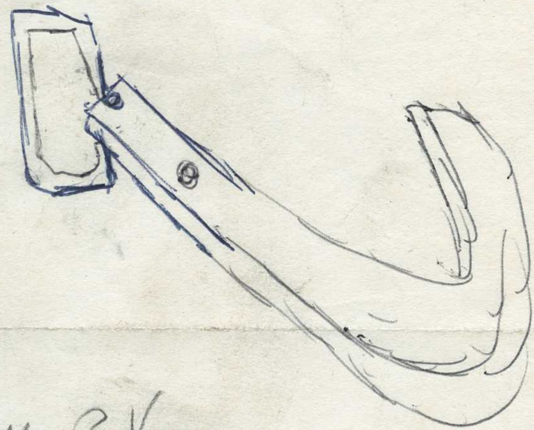
An OPORD change will be forthcoming as a review of requirements is ascertained.

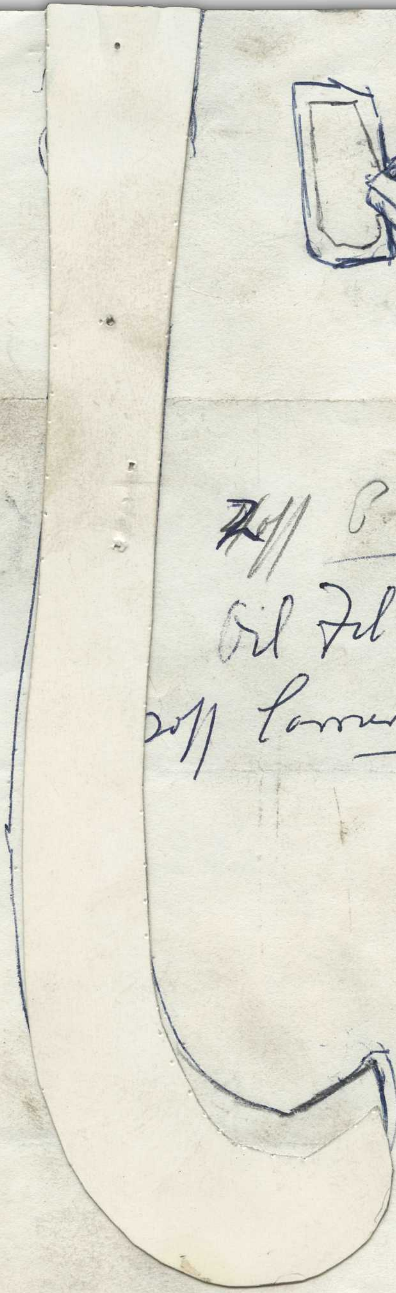
Director, Marine Operations
Coastal Marine Operations

cc. First Officer)
Second Officer)
Chief Engineer) "Carrier Princess"
Second Engineer)
Cook)

Messrs. J.M. Ferguson
J.D. Finnie
T. King
J.W. McCowatt
A. Meijer

Form 102-R

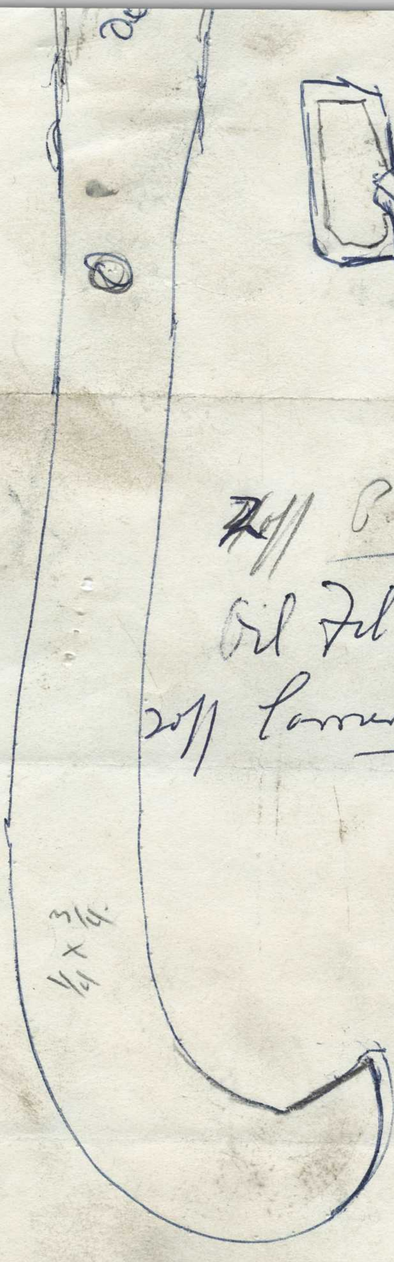


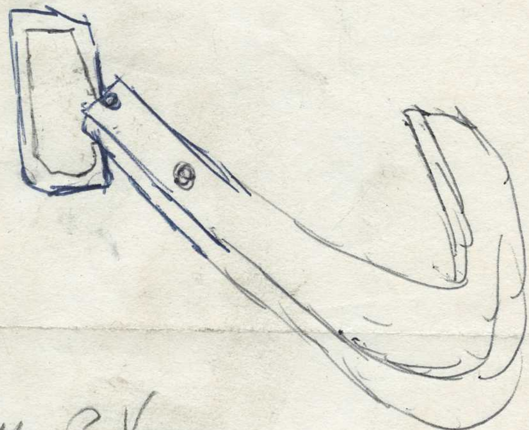


Doff P. Vane

Oil Filter Tongs for

Doff Carrier Pinions - April 25/73





2off P-Vane

Oil Filter Tongs for

2off Carrier Pinions - April 25/73

CP Rail
Internal Correspondence

Date April 4/76.

From Chief Engineer, CARRIER PRINCESS

To T.King, Esq., Supt. Engineer, B.C.C.S.S., Vancouver, B.C.

Dear Sir:

Attached please find sketch of thermometer showing sizes as to type of stem that will fit the pockets on most of our machinery in engine room.

Yours truly,
J. M. Irwin
Chief Engineer.

RECEIVED
APR 5 1976
MANAGER
B.C. COAST STEAMSHIP SERVICE
VANCOUVER, B.C.

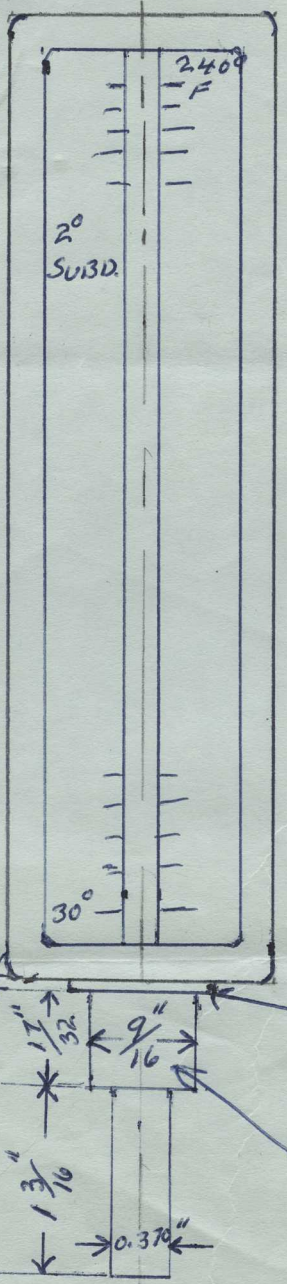
Form 102A-R

CP Rail
Internal Correspondence

Date APRIL 3/76

From CHIEF ENGR CARRIER PRINCESS

To



TOTAL LENGTH 8"
IF SUITABLE MAKE OF THERM IS FOUND LENGTH CAN VARY.

30° TO 240° FAH.
2° SUBDIVISIONS

GLASS COVERED FACE.

MERCURY RED COLOURED

1/16"

17/32"

9/16"

POCKET FITS UP TO SHOULDER & HOLDS THERM. BY SET SCREW

POCKETS ON VESSEL ARE 2 3/8" LONG & ARE 1/2" PIPE THREAD

PLAIN SHANK.

1 3/16"

0.370"

DIA. OF STEM 0.370" (3/8")

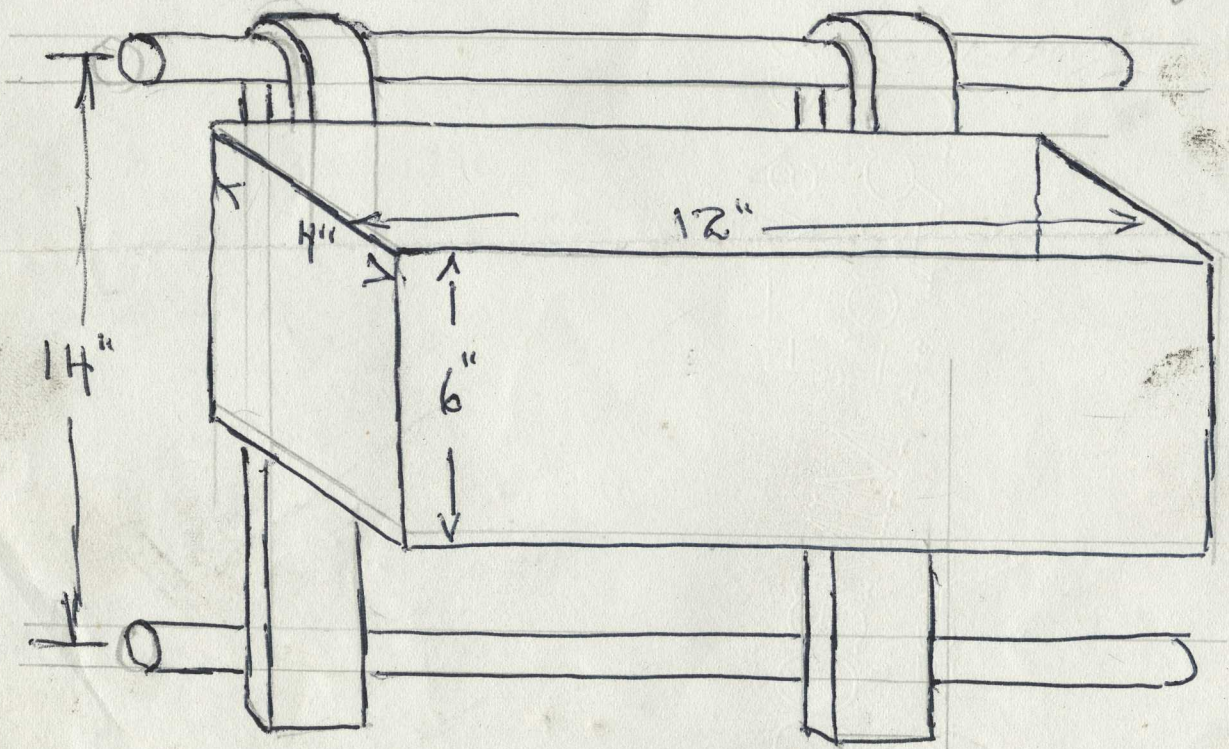
PRINTED IN CANADA Form 102-R

Carrier Pigeon Oct/73

ASH TRAYS

DYNA METALS
ARE MAKING
SEPT 7/73
HG

120 FF



PREVENTIVE MAINTENANCE METHODS LTD.

GEAR OIL, HYDRAULIC OIL, ETC., ANALYSIS REPORT

7084 RUSSELL ST., BURNABY 1, B.C. PHONE: 435-4131, 435-4132

Associated with
USHER LABORATORIES LIMITED

NEUTRAL — IMPARTIAL — UNBIASED

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
CARRIER PRINCESS	Port Gr Box	EP 3	752 EP3	x	x	x	1											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 TOTAL SERVICE: OIL SERVICE LIFE:

I.O.L. MARINE DEPT.

The gross metal wear content still shows negligible. We find no significant outside foreign matter. Total insolubles continue low at under 0.1%. Viscosity shows some increase but not enough for concern. This oil shows good condition and is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
	Star.Gear Box	EP 3	744 EP3	x	x	x	1											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 TOTAL SERVICE: OIL SERVICE LIFE:

The gross metal wear content still shows negligible. We find no significant outside foreign matter. Total insolubles continue low at under 0.1%. Viscosity shows some increase but not enough for concern. This oil shows good condition and is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
	Bow Thruster Gear	90 ,	508 90	x	Tr	Tr(1-)	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 TOTAL SERVICE: OIL SERVICE LIFE:

The gross metal wear content continues low. There is no significant outside foreign matter. Total insolubles are low at under 0.1%. Viscosity is normal. This oil shows good condition and is suitable for continued service.

RED—REQUIRES EARLY ATTENTION X=NIL I.O.L. CARRIER PRINCESS MARINE DEP.T.

UNIT:

PAGE:

VISCOSITY

usually increases with use and any contamination. Only excessive viscosity increase requires attention, and the cause will be remarked upon.

METAL WEAR

is indicated in total amount. The amount varies directly with the time in use, or with contamination level. Remarks indicate whether wear is normal or abnormal, and probable cause of above normal wear.

WATER

is a contaminant which increases oil viscosity and metal wear, even in small amounts. Greater amounts of water can be dangerous.

ABRASIVES

are dirt and metal chips. When present in above normal amounts, remarks indicate whether dirt and sand or metal chips form the major part.

ACID INDEX: NEGATIVE to 4 — Normal.
5 to 7 — approaching time to change oil.
8 up — suggest change oil.

PREVENTIVE MAINTENANCE METHODS LTD.

7084 RUSSELL ST., BURNABY 1, B.C.
PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
CARRIER PRINCESS #3 GEN	30	320 30	1.0	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

I.O.L. MARINE DEPT.

All items here on the engine show normal. Oil viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at under 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
Emerg. Gen	30	322 30	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at under 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
Bow Thruster ~~#3 Eng.~~	30	288 30	0.5	x	x	Tr	Tr	4	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Sludge volume shows much improvement over the last sample, but is still more than normal at 0.8% and consists of normal combustionproducts. Oil viscosity shows little change. This oil shows good condition in all other respects so that with an improvement once again in the purifier efficiency, this oil will be suitable for continue service.

RED–REQUIRES EARLY ATTENTION X=NIL I.O.L. MARINE DEPT

UNIT: CARRIER PR. UNIT:

The report form is designed so that the significant results of the report can be determined as quickly as possible. Where no comment is made about an item, it will mean that the item concerned is well within the normal range, that no trend is being established in either direction and that no corrective action is necessary.

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TEST SEQUENCE No. 1

Includes Physical Properties tests as well as Spectrophotometric Analysis. Physical properties test results are indicated to the left of the bold dividing line in the approximate center of the report form. Spectro Analysis results are indicated to the right of this line.

TEST SEQUENCE No. 2

Includes Physical Properties tests only.

SPECTROPHOTOMETRIC ELEMENTS are expressed in parts per million; The number 50, for example, under any Spectrophotometric Element heading means that 50 parts per million of the element has been detected in the sample.

NOTE:—If Spectro Analysis is desired, be sure that Test Sequence No. 1 is checked off by the person filling out the data slip provided with the sample jar.

ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

7084 RUSSELL ST., BURNABY 1, B.C.
PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
CARRIER PRINCESS POME	340	604 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

I.O.L. MARINE DEPT.

All items here on the engine show normal. Oil viscosity shows some increase but not enough for concern. Purifier shows good efficiency. Sludge content is low at under 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PIME	40	680 40	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show norml. Oil viscosity shows some increase but not enough for concern. Purifier shows good efficiency. Sludge contant is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SOME	40	654 40	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows some increase but not enough for concern. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

UNIT:

RED–REQUIRES EARLY ATTENTION X=NIL I.O.L. MARINE DEPT UNIT: CARRIER PRINCESS

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ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive
   (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

7084 RUSSELL ST., BURNABY 1, B.C.
PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
CARRIER PRINCESS SINE	40	584 40	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

I.O.L. MARINE DEPT.

All items here on the engine show normal. Oil viscosity shows some increase but not enough for concern. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#1 GEN	30	288 30	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows little change. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#2 GEN	30	266 30	1.0	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: June 29/74 ANALYSIS MADE: July 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows little change. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

UNIT:

RED–REQUIRES EARLY ATTENTION X=NIL I.O.L. MARINE DEPT UNIT: CARRIER PRINCESS

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ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
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ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

7084 RUSSELL ST., BURNABY 1, B.C.
PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
# 3 GEN	30	372 30	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Aug 1/74 ANALYSIS MADE: Aug 12/74 TOTAL MILES/HRS. ON UNIT: ? ON OIL: 241 hours.

IOL for CPR the CARRIER PRINCESS: All items here on the engine show normal. Oil viscosity shows only a small increase which is not of concern. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable jfor much longer service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER ENGINE	30	282 30	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Jul 13/74 ANALYSIS MADE: Aug 12/74 TOTAL MILES/HRS. ON UNIT: ? ON OIL: ?

All items here on the engine show normal. Oil viscosity is changed little. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER	30	372 30	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Aug 1/74 ANALYSIS MADE: Aug 12/74 TOTAL MILES/HRS. ON UNIT: ? ON OIL: 28 hours.

All items here on the engine show normal. Viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

RED–REQUIRES EARLY ATTENTION

X=NIL

IOL for CPR

UNIT: # 3 GEN, Bow Thruster Engine & Bow Thruster.

UNIT: CARRIER PRINCESS

PAGE:

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4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
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SLUDGE INDEX NUMBERS

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3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

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DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
sime	40	40 564	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Aug 1/74 ANALYSIS MADE: Aug 12/74 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 1365 Hrs.

IOL for CPR the CARRIER PRINCESS: All items here on the engine show normal. Oil viscosity continues in the same region. Purifier shows good efficiency. Sludge content continues low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#1 GEN	30	30 348	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Aug 1/74 ANALYSIS MADE: Aug 12/74 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 124 Hours.

All items here on the engine show normal. Oil viscosity shows only a small increase which is not of concern. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for much longer service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
# 2 GEN	30	30 366	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Aug 1/74 ANALYSIS MADE: Aug 12/74 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 246 hours.

All items here on the engine show normal. Oil viscosity shows only a small increase which is not of concern. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for much longer service.

RED–REQUIRES EARLY ATTENTION

X=NIL

IOL forCXPR

UNIT: SIME, #1 & #2 GEN

UNIT: CARRIER PRINCESS

PAGE:

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TEST SEQUENCE No. 1

Includes Physical Properties tests as well as Spectrophotometric Analysis. Physical properties test results are indicated to the left of the bold dividing line in the approximate center of the report form. Spectro Analysis results are indicated to the right of this line.

TEST SEQUENCE No. 2

Includes Physical Properties tests only.

SPECTROPHOTOMETRIC ELEMENTS are expressed in parts per million; The number 50, for example, under any Spectrophotometric Element heading means that 50 parts per million of the element has been detected in the sample.

NOTE:—If Spectro Analysis is desired, be sure that Test Sequence No. 1 is checked off by the person filling out the data slip provided with the sample jar.

ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

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PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
POME	40	636 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Aug 1/74 ANALYSIS MADE: Aug 12/74 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 1164 hrs.

I.O.L. for CPR the CARRIER PRINCESS: All items here on the engine show normal. Oil viscosity continues in the same region Purifier shows good efficiency. Sludge content continues low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PIME	40	603 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Aug 1/74 ANALYSIS MADE: Aug 12/74 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 1266 hrs.

All items here on the engine show normal. Oil viscosity continues in the same region. Purifier shows good efficiency. Sludge content continues low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SOME	40	616 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Aug 1/74 ANALYSIS MADE: Aug 12/74 *TOTAL MILES/HRS. ON UNIT:* / ? ON OIL: 1266 hrs.

All items here on the engine show normal. Oil viscosity continues in the same region. Purifier shows good efficiency. Sludge content continues low at 0.1%. This oil is suitable for continued service.

UNIT: CARRIER PRINCESS

RED–REQUIRES EARLY ATTENTION

X=NIL IOL for CPR

UNIT: POME, PIME & SOME

PAGE:

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TEST SEQUENCE No. 2

Includes Physical Properties tests only.

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NOTE:—If Spectro Analysis is desired, be sure that Test Sequence No. 1 is checked off by the person filling out the data slip provided with the sample jar.

ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive
   (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

GEAR OIL, HYDRAULIC OIL, ETC., ANALYSIS REPORT

7084 RUSSELL ST., BURNABY 1, B.C. PHONE: 435-4131, 435-4132

Associated with
USHER LABORATORIES LIMITED

NEUTRAL — IMPARTIAL — UNBIASED

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
~~CARRIER~~ PRINCESS	~~Port~~ Gear ~~Box~~	EP 3	~~728~~ EP 3	x	x	x	2											

SAMPLE DRAWN: Aug.1/74 ANALYSIS MADE: Aug.12/74 TOTAL SERVICE: OIL SERVICE LIFE:

I.O.L. FOR CPR.

Gross metal wear content again shows negligible. There is no significant outside foreign matter. Total insolubles are still low at 0.1%. Viscosity is in the normal region. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
~~CARRIER~~ PRINC.	~~Star.~~ Gear Box	EP 3	~~732~~ EP 3	x	x	x	2											

SAMPLE DRAWN: Aug.1/74 ANALYSIS MADE: Aug.12/74 TOTAL SERVICE: OIL SERVICE LIFE:

Gross metal wear content again shows negligible. There is no significant outside ~~foreign~~ foreign matter. Total insolubles are still low at 0.1%. Viscosity is in the normal region. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
~~CARRIER~~ PRINC.	~~Bow Thr.~~ Gear	90	~~503~~ 90	x	x	x	Neg											

SAMPLE DRAWN: Aug.1/74 ANALYSIS MADE: Aug.12/74 TOTAL SERVICE: OIL SERVICE LIFE:

Gross metal wear content shows negligible this time. We find no significant outside foreign matter. Total insolubles continue low at under 0.1%. Viscosity shows little change. This oil is suitable for continued service.

UNIT:

PAGE:

RED—REQUIRES EARLY ATTENTION

X=NIL

I.O.L. FOR CPR CARRIER PRINCESS

Att. Capt. E. Knaut

VISCOSITY

usually increases with use and any contamination. Only excessive viscosity increase requires attention, and the cause will be remarked upon.

METAL WEAR

is indicated in total amount. The amount varies directly with the time in use, or with contamination level. Remarks indicate whether wear is normal or abnormal, and probable cause of above normal wear.

WATER

is a contaminant which increases oil viscosity and metal wear, even in small amounts. Greater amounts of water can be dangerous.

ABRASIVES

are dirt and metal chips. When present in above normal amounts, remarks indicate whether dirt and sand or metal chips form the major part.

ACID INDEX: NEGATIVE to 4 — Normal.
5 to 7 — approaching time to change oil.
8 up — suggest change oil.

PREVENTIVE MAINTENANCE METHODS LTD.

GEAR OIL, HYDRAULIC OIL, ETC., ANALYSIS REPORT

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Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PORT GEAR BOX		EP3	764 EP3	x	x	Tr	0											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 TOTAL SERVICE: OIL SERVICE LIFE:

IOL MARINE DIVN: CPR CARRIER PRINCESS: Gross metal wear content is very low. There is no significant outside foreign matter. Total insolubles are low at under 0.1%. Viscosity continues in the same region. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
STBD GEAR BOX		EP3	776 EP3	x	x	Tr	0											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 TOTAL SERVICE: OIL SERVICE LIFE:

Gross metal wear content is very low. There is no signficant outside foreign matter. Total insolubles are low at under 0.1%. Viscosity continues in the same region. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER GEAR		90	493 90	x	Tr	Tr	Neg											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 TOTAL SERVICE: 844 Hours OIL SERVICE LIFE:

Gross metal wear content is very low. There is no significant outside foreign matter. Total insolubles are low at under 0.1%. The viscosity has changed little. This oil is suitable for continued service.

RED—REQUIRES EARLY ATTENTION

X=NIL

IOL MARINE DIVN:CPR CARRIER PRINCESS

UNIT: PORT&STBD GEAR BOX
BOW THRUSTER GEAR

PAGE:

VISCOSITY

usually increases with use and any contamination. Only excessive viscosity increase requires attention, and the cause will be remarked upon.

METAL WEAR

is indicated in total amount. The amount varies directly with the time in use, or with contamination level. Remarks indicate whether wear is normal or abnormal, and probable cause of above normal wear.

WATER

is a contaminant which increases oil viscosity and metal wear, even in small amounts. Greater amounts of water can be dangerous.

ABRASIVES

are dirt and metal chips. When present in above normal amounts, remarks indicate whether dirt and sand or metal chips form the major part.

ACID INDEX: NEGATIVE to 4 — Normal.
5 to 7 — approaching time to change oil.
8 up — suggest change oil.

PREVENTIVE MAINTENANCE METHODS LTD.

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DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#3 GEN	30	388 40	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 *TOTAL MILES/HRS. ON UNIT:* 7327 Hours ON OIL:

IOL MARINE DIVN:CPR CARRIER PRINCESS: All items here on the engine show normal. Oil viscosity has risen by only a small amoun Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER ENG	30	394 40	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 *TOTAL MILES/HRS. ON UNIT:* 863 Hours ON OIL:

All items here on the engine show normal. Oil viscosity has risen by only a small amount. Purifier efficiency is good. Sludge content is lowat 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL

SAMPLE DRAWN: ANALYSIS MADE: *TOTAL MILES/HRS. ON UNIT:* ON OIL:

RED–REQUIRES EARLY ATTENTION

X=NIL

IOL MARINE DIVN:CPR CARRIER PRINCESS
UNIT:

UNIT: #3 GEN, BOW THRUSTER ENG.
PAGE:

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TEST SEQUENCE No. 1

Includes Physical Properties tests as well as Spectrophotometric Analysis. Physical properties test results are indicated to the left of the bold dividing line in the approximate center of the report form. Spectro Analysis results are indicated to the right of this line.

TEST SEQUENCE No. 2

Includes Physical Properties tests only.

SPECTROPHOTOMETRIC ELEMENTS are expressed in parts per million; The number 50, for example, under any Spectrophotometric Element heading means that 50 parts per million of the element has been detected in the sample.

NOTE:—If Spectro Analysis is desired, be sure that Test Sequence No. 1 is checked off by the person filling out the data slip provided with the sample jar.

ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.
4.
5. — Change Oil Now.
6.
7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

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PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SIME	40	568 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 TOTAL MILES/HRS. ON UNIT: 7379 Hours ON OIL:

IOL MARINE DIVN:CPR CARRIER PRINCESS: All items here on the engine show normal. Oil viscosity has changed little. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#1 GEN	30	456 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 TOTAL MILES/HRS. ON UNIT: 7651 Hurs ON OIL: 500 Hrs.

All items here on the engine show normal. Oil viscosity shows a further small rise but this alone is not of concern. Purifier efficiency is good. Sludge content is low at 0.2%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#2 GEN	30	357 30	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 TOTAL MILES/HRS. ON UNIT: 7302 Hours ON OIL:

All items here on the engine show normal. Oil viscosity has risen by only a small amount. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

RED–REQUIRES EARLY ATTENTION

X=NIL IOL MARINE DIVN:CPR CARRIER PRINCESS UNIT:

UNIT: SIME, #1&2 GEN

PAGE:

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ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

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PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
POME	40	40 544	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 *TOTAL MILES/HRS. ON UNIT:* 7443 Hours ON OIL:

IOL:MARINE DIVN - CPR: MV CARRIER PRINCESS: All items here on the engine show normal. Oil viscosity has changed little . Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PIME	40	40 638	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 *TOTAL MILES/HRS. ON UNIT:* 7436 Hours ON OIL:

[redacted]: All items here on the engine show normal. Oil viscosity shows a moderate rise but this alone is not of concern. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SOME	40	40 540	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Nov 1/74 ANALYSIS MADE: Nov 20/74 *TOTAL MILES/HRS. ON UNIT:* 7438 Hours ON OIL:

All items here on the engine show normal. Oil viscosity has changed little. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

RED–REQUIRES EARLY ATTENTION

X=NIL

IOL MARINE DIVN:CPR:MV CARRIER PRINCESS
UNIT:

UNIT: POME,PIME,SOME

PAGE:

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TEST SEQUENCE No. 1

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TEST SEQUENCE No. 2

Includes Physical Properties tests only.

SPECTROPHOTOMETRIC ELEMENTS are expressed in parts per million; The number 50, for example, under any Spectrophotometric Element heading means that 50 parts per million of the element has been detected in the sample.

NOTE:—If Spectro Analysis is desired, be sure that Test Sequence No. 1 is checked off by the person filling out the data slip provided with the sample jar.

ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

FOR YOUR INFORMATION. WE HAVE OUR OWN COPY

Lyall

SEND SOME MACHINERY LOG BOOKS PLEASE

PREVENTIVE MAINTENANCE METHODS LTD.

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PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
MV CARRIER PRINCESS POME	40	628 40	0.5	x	x	x	Tr	2	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

IOL for CPR: All items here on the engine show normal. Oil viscosity shows some increase but not yet enough for concern. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PIME	40	608 40	0.5	x	x	x	Tr	2	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

All items here on the engine show normal. Oil viscosity shows some increase but not yet enough for concern. Purifer shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SOME	40	594 40	0.5	x	x	x	Tr	2	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

All items here on the engine show normal. Oil viscosity shows some increase but not yet enough for concern. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

RED–REQUIRES EARLY ATTENTION

X=NIL

IOL for CPR

UNIT: MV PRINCESS CARRIER.

UNIT: POME, PIME, SOME

PAGE:

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NOTE:—If Spectro Analysis is desired, be sure that Test Sequence No. 1 is checked off by the person filling out the data slip provided with the sample jar.

ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

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PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
MV CARRIER PRINCESS SIME	40	612 40	0.5	x	x	x	Tr	2	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

IOL for CPR: All items here on the engine show normal. Oil viscosity shows some increase but not yet enough for concern. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
# 1 GEN.	30	270 30	0.5	x	x	Tr	Tr	2	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

All items here on the engine show normal. Oil viscosity is normal. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
# 2 GEN.	30	332 30	0.5	x	x	Tr	Tr	4	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

All items here on the engine show normal. Oil viscosity is normal. R The Sludge volume is higher than recommended at 1.0% and this consists of normal combustion products. The oil shows good in all other respects so that with an improvement in the Purifier efficiency, This oil will be suitable for continued service.

UNIT: SIME, #1 & #2 GEN.

RED–REQUIRES EARLY ATTENTION

X=NIL IOL for CPR

UNIT: MV CARRIER PRINCESS PAGE:

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ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

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PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
MV CARRIER PRINCESS # 3 GEN	30	280 30	0.5	x	x	x	Tr	2	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

IOL for CPR: All items here on the engine show normal. Oil viscosity is normal. Purifier shows good efficiency. Sludge content is low at under 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
EMERGENCY GENERATOR	30	279 30	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

All items here on the engine show normal. Oil viscosity is normal. Purifier shows good efficiency. Sludge content is low at under 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER	30	362 30	0.5	x	x	Tr	Tr	5	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

The Sludge volume is higher than before and is now well above normal, and expressed as Naptha Insolubles measures 2.0%. This consists of an accumulation of normal combustion products. Other items on the engine show normal. The oil shows good in all other respects. With an improvement in the purifier efficiency this oil will be suitable for continued service.

RED–REQUIRES EARLY ATTENTION X=NIL IOL for CPR

UNIT: MV CARRIER PRINCESS PAGE: UNIT: #3 Gen. Emerg Gen & Bow Thruster

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ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

GEAR OIL, HYDRAULIC OIL, ETC., ANALYSIS REPORT

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Associated with
USHER LABORATORIES LIMITED

NEUTRAL — IMPARTIAL — UNBIASED

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
MV CARRIER PRINCESS	PORT GEAR BOX	EP3	622 EP3	x	x	x	0											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL SERVICE: OIL SERVICE LIFE:

IOL for CPR: Gross metal wear content shows negligible. We find no significant outside foreign matter. Total insolubles as Naptha insolubles are low at 0.1%. Viscosity is in the normal region. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
MV CARRIER PRINCESS	STBD GEAR BOX	EP3	772 EP3	x	x	Tr(1-)	1											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL SERVICE: OIL SERVICE LIFE:

Gross metal wear content is very low. There is no significant outside foreign matter. Total insolubles expressed as Naptha insolubles are low at under 0.1%. Viscosity continues in the same region. This oil shows good condition and is still suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
MV CARRIER PRINCESS	BOW THRUSTER GEARBOX		512 EP3	x	Tr	Tr (1-)	Neg											

SAMPLE DRAWN: May ANALYSIS MADE: May 10/74 TOTAL SERVICE: OIL SERVICE LIFE:

The Gross metal wear content is very low. We find no significant outside foreign matter. Total insolubles as Naptha insolubles are low at under 0.1%. Viscosity is in the normal region. This oil shows good condition and is suitable for continued service.

RED—REQUIRES EARLY ATTENTION

X=NIL IOL for CPR

UNIT: MV CARRIER PRINCESS
PAGE:

VISCOSITY

usually increases with use and any contamination. Only excessive viscosity increase requires attention, and the cause will be remarked upon.

METAL WEAR

is indicated in total amount. The amount varies directly with the time in use, or with contamination level. Remarks indicate whether wear is normal or abnormal, and probable cause of above normal wear.

WATER

is a contaminant which increases oil viscosity and metal wear, even in small amounts. Greater amounts of water can be dangerous.

ABRASIVES

are dirt and metal chips. When present in above normal amounts, remarks indicate whether dirt and sand or metal chips form the major part.

ACID INDEX: NEGATIVE to 4 — Normal.
5 to 7 — approaching time to change oil.
8 up — suggest change oil.

CP Rail
Internal Correspondence

Date 22nd November, 1979.

From D. BROADBENT, FIRST OFFICER, CARRIER PRINCESS

To AN CAIRNS, DIRECTOR MARINE OPERATIONS.

In order to reduce the amount of sea water entering the cable locker and Bow Thruster compartments, it is proposed that P.V.C. covers be manufactured and fitted around the cables at the top of the Navel Pipe.

The covers should be of the "lace up" variety. Ships staff could assist with design shape.

Cement has been suggested, but this seems to be rather a crude method!!

Registration note is enclosed in the event of approval.

D. Broadbent
1/o "C.P."

Form 102-R

PREVENTIVE MAINTENANCE METHODS LTD.

GEAR OIL, HYDRAULIC OIL, ETC., ANALYSIS REPORT

7084 RUSSELL ST., BURNABY 1, B.C. PHONE: 435-4131, 435-4132

NEUTRAL — IMPARTIAL — UNBIASED

M V Carrier

Associated with
USHER LABORATORIES LIMITED

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PORT GEAR	BOX	EP3	760 EP3	x	x	x	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 TOTAL SERVICE: OIL SERVICE LIFE:

Gross metal wear content shows negligible. There is no significant outside foreign matter. Total insolubles are low at 0.1% Oil viscosity is normal. Oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
STBD GEAR	BOX	EP3	796 EP3	x	x	x	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 TOTAL SERVICE: OIL SERVICE LIFE:

Gross metal wear content shows negligible. There is no significant outside foreign matter. Total insolubles are low at 0.1%. Oil viscosity is normal. Oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER GEAR		90	411 90	x	Tr	Tr	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 TOTAL SERVICE: OIL SERVICE LIFE:

Gross metal wear content continues very low. We find no significant outside foreign matter. Total insolubles are low at under 0.1%. Viscosity shows some variation but is still in the normal region. This oil is suitable for continued service.

RED—REQUIRES EARLY ATTENTION

X=NIL

IOL/CPR MARINE DIVN: CARRIER PRINCESS

UNIT: PORT & STBD GEAR BOXES. BOW THRUSTER GEAR

PAGE:

VISCOSITY

usually increases with use and any contamination. Only excessive viscosity increase requires attention, and the cause will be remarked upon.

METAL WEAR

is indicated in total amount. The amount varies directly with the time in use, or with contamination level. Remarks indicate whether wear is normal or abnormal, and probable cause of above normal wear.

WATER

is a contaminant which increases oil viscosity and metal wear, even in small amounts. Greater amounts of water can be dangerous.

ABRASIVES

are dirt and metal chips. When present in above normal amounts, remarks indicate whether dirt and sand or metal chips form the major part.

ACID INDEX: NEGATIVE to 4 — Normal.
5 to 7 — approaching time to change oil.
8 up — suggest change oil.

PREVENTIVE MAINTENANCE METHODS LTD.

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PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
# 3 GEN	30	386 40	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a small increase but not enough for concern. Purifier efficiency is good. Sludge content is low at 0.1%. Oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
EMERGENCY GEN	30	308 30	1.0	x	x	x	x	2	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity is changed little. Purifier efficiency is good. Sludge content is low at under 0.1%. Oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER ENGINE	30	406 40	0.5	x	x	tr	x	2	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a small increase but not enough for concern. Purifier efficiency is good. Sludge content is low at 0.2%. Oil is suitable for continued service.

RED-REQUIRES EARLY ATTENTION

IOL/CPR:MARINE DIVN

X=NIL

UNIT: CARRIER PRINCESS

UNIT: # 3 GEN, EMERGENCY GEN BOW THRUSTER ENG.

PAGE:

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TEST SEQUENCE No. 1

Includes Physical Properties tests as well as Spectrophotometric Analysis. Physical properties test results are indicated to the left of the bold dividing line in the approximate center of the report form. Spectro Analysis results are indicated to the right of this line.

TEST SEQUENCE No. 2

Includes Physical Properties tests only.

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NOTE:—If Spectro Analysis is desired, be sure that Test Sequence No. 1 is checked off by the person filling out the data slip provided with the sample jar.

ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

7084 RUSSELL ST., BURNABY 1, B.C.
PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

MV Carrier

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
POME	40	604 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a small rise. Purifier efficiency is good. Sludge content is low at under 0.1%. Oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PIME	40	588 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a small rise. Purifier efficiency is good. Sludge content is low at under 0.1%. Oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SOME	40	584 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a small rise. Purifier efficiency is good. Sludge content is low at under 0.1%. Oil is suitable for continued service.

UNIT: POME, SIME, SOME

RED–REQUIRES EARLY ATTENTION X=NIL IOL/CPR MARINE DIVN UNIT: CARRIER PRINCESS PAGE:

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ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
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ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

7084 RUSSELL ST., BURNABY 1, B.C.
PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SIME	40	600 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: D Nov 30/74 ANALYSIS MADE: DEC 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a small rise. Purifier efficiency is good. Sludge content is low at under 0.1%. Oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
# 1 GEN	30	403 40	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a small increase but not enough for concern. Purifier efficiency is good. Sludge content is low at 0.1%. Oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
# 2 GEN	30	398 40	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Nov 30/74 ANALYSIS MADE: DEC 11/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a small increase but not enough for concern. Purifier efficiency is good. Sludge content is low at 0.1%. Oil is suitable for continued service.

UNIT: SIME, #1 & 2 GEN

RED–REQUIRES EARLY ATTENTION X=NIL IOL/CPR MARINE DIVN UNIT: CARRIER PRINCESS PAGE:

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ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive
   (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

GEAR OIL, HYDRAULIC OIL, ETC., ANALYSIS REPORT

7084 RUSSELL ST., BURNABY 1, B.C. PHONE: 435-4131, 435-4132

NEUTRAL — IMPARTIAL — UNBIASED

Associated with
USHER LABORATORIES LIMITED

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PORT GEAR	BOX	EP3	784 EP3	x	x	x	1											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 TOTAL SERVICE: OIL SERVICE LIFE:

IOL:CARRIER PRINCESS - Gross metal wear content still shows negligible. We find no significant outside foreign matter. Total insolubles continue low at under 0.1%. Viscosity continues in the same region. This oil is suitable for ~~XXXXX~~ continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
STBD GEAR	BOX	EP3	832 EP3	x	x	x	1											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 TOTAL SERVICE: OIL SERVICE LIFE:

Gross metal wear content shows negligible. There is no significant outside foreign matter. Total insolubles continue low at under 0.1%. The viscosity shows only a little higher. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER	GEAR	90	536 90	x	x	x	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 TOTAL SERVICE: OIL SERVICE LIFE:

Gross metal wear content is so low as to be considered negligible. There is no outside foreign matter. Total insolubles are low at under 0.1%. Viscosity shows little change. This oil is in good condition and is suitable for continued service.

RED—REQUIRES EARLY ATTENTION

X=NIL IOL:MARINE DIVN. CARRIER PRINCESS.

UNIT: PORT & STBD GEAR BOX & BOW THRUSTER

PAGE: GEAR

VISCOSITY

usually increases with use and any contamination. Only excessive viscosity increase requires attention, and the cause will be remarked upon.

METAL WEAR

is indicated in total amount. The amount varies directly with the time in use, or with contamination level. Remarks indicate whether wear is normal or abnormal, and probable cause of above normal wear.

WATER

is a contaminant which increases oil viscosity and metal wear, even in small amounts. Greater amounts of water can be dangerous.

ABRASIVES

are dirt and metal chips. When present in above normal amounts, remarks indicate whether dirt and sand or metal chips form the major part.

ACID INDEX: NEGATIVE to 4 — Normal.
5 to 7 — approaching time to change oil.
8 up — suggest change oil.

PREVENTIVE MAINTENANCE METHODS LTD.

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DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#3 GEN	30	40 402	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

IOL:CARRIER PRINCESS - All items here on the engine show normal. Oil viscosity shows a moderate increase into the SAE 40 range but this is not enough for concern. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
EMERG.GEN.	30	30 300	1.0	x	x	Tr	Tr	2	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity has changed little. Purifier efficiency is good. Sludge content is low at under 0.1%. This oil is suitable for much longer service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER ENGINE	30	40 406	1.0	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a moderate increase which is not enough for concern. Oil purifier shows good efficiency with sludge content low at 0.1%. This oil is suitable for continued service.

RED-REQUIRES EARLY ATTENTION

X=NIL IOL:MARINE DIVN

UNIT:CARRIER PRINCESS

UNIT: #3 GEN, EMERGENCY GEN & BOW THRUSTER ENGINE

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4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
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ACID INDEX NUMBER

Negative, O — Normal

1.
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5. — Change Oil Now.
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7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

7084 RUSSELL ST., BURNABY 1, B.C.
PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SIME	40	566 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

IOL:CARRIER PRINCESS - All items here on the engine show normal. Oil viscosity has changed little. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for jcontinued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#1 GEN	30	422 40	1.0	x	x	x	Tr	2	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a moderate increase into the SAE 40 range but this is not enough for concern. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#2 AUX	30	438 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows a moderate increase into the SAE 40 range but this is not enough for concern. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

UNIT: SIME #1 GEN & #2 AUX.

RED-REQUIRES EARLY ATTENTION

X=NIL IOL:MARINE DIVN.

UNIT: CARRIER PRINCESS PAGE:

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3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

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2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

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ACID INDEX NUMBER

Negative, O — Normal

1.
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3.
4.
5. — Change Oil Now.
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7. — Urgent, Change Oil.
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PREVENTIVE MAINTENANCE METHODS LTD.

7084 RUSSELL ST., BURNABY 1, B.C.
PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
POME	40	40 588	0.5	x	x	x	Tr	2	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

IOL:CARRIER PRINCESS: All items here on the engine show normal. Oil viscosity has changed little. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PIME	40	40 584	0.5	x	x	Tr	Tr	2	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity has changed little. Purifier efficiency is good. Sludge content is low at 0.1%. This oil is suitable for continued service.

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UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SOME	40	40 590	0.5	x	x	x	Tr	2	Neg											

SAMPLE DRAWN: Sep 1/74 ANALYSIS MADE: Sep 6/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity has changed little. Purifier efficiency is jgood. Sludge content is low at 0.1%. This oil is suitable for continued service.

UNIT: POME-PIME-SOME

RED-REQUIRES EARLY ATTENTION

X=NIL IOL:MARINE DIVN

UNIT: CARRIER PRINCESS PAGE:

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NOTE:—If Spectro Analysis is desired, be sure that Test Sequence No. 1 is checked off by the person filling out the data slip provided with the sample jar.

ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

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PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
POME	40	516 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

IOL:MARINE DIVN: for CPR - MV CARRIER PRINCESS: All itmes here on the engine show normal. Oil viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at only 0.1%. This oil shows good condition and is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PIME	40	508 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

All items here on the engine show normal. Oil viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at only 0.1%. This oil shows good condition and is suitable for continued service.

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UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SOME	40	532 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

All items here on the engine show normal. Oil viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at only 0.1%. This oil shows good condition and is suitable for continued service.

RED-REQUIRES EARLY ATTENTION

X=NIL IOL:MARINE DIVN: for CPR UNIT: POME, PIME & SOME.

UNIT: MV CARRIER PRINCES

PAGE:

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1. S.A.E. No. Changes two grades.
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1. Nil
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ACID INDEX:

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ACID INDEX NUMBER

Negative, O — Normal

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PREVENTIVE MAINTENANCE METHODS LTD.

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PHONE: 435-4131, 435-4132

DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
SIME	40	512 40	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

IOL:MARINE DIVN: for CPR – MV CARRIER PRINCESS: All items here on the engine show normal. Oil viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at only 0.1%. This oil shows good condition and is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#1 GEN.	30	252 30	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity is normal. Purifier shows good efficiency. Sludge content is low at 0.1%. This oil is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#2 GEN.	30	258 30	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

All items here on the engine show normal. Oil viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at only 0.1%. This oil shows good condition and is suitable for continued service.

UNIT: CARRIER PRINCESS

RED–REQUIRES EARLY ATTENTION

X=NIL IOL:MARINE DIVN: for CPR UNIT: SIME, #1 & 2 GEN. PAGE:

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PREVENTIVE MAINTENANCE METHODS LTD.

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DIESEL FUELED EQUIPMENT

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
#3 GEN	30	30 238	0.5	x	x	x	x	2	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

IOL:MARINE DIVN: for CPR - MV CARRIER PRINCESS. All items here on the engine show normal. Oil viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at only 0.1%. This oil shows good condition and is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
EMERGENCY GEN.	30	30 280	0.5	x	x	Tr	x	2	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

All items here on the engine show normal. Oil viscosity shows only a small increase. Purifier shows good efficiency. Sludge content is low at only 0.1%. This oil shows good condition and is suitable for continued service.

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UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER	30	40 408	0.5	x	x	x	Tr	6	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 TOTAL MILES/HRS. ON UNIT: ON OIL:

All items here on the engine show normal. The sludge volume continues well above the recommended value and this time has risen to 6% by volume. This consists of normal combustion products and is responsible for raising the viscosity higher into the SAE 40 range. All other items on the oil shows normal so that with an improvement in purifier efficiency or a change of oil filters this oil will be suitable for continued service.

UNIT: CARRIER PRINCESS

RED-REQUIRES EARLY ATTENTION

X=NIL IOL:MARINE DIVN: for CPR UNIT: #3 GEN, EMERGENCY GEN & BOW THRUSTER. PAGE:

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PREVENTIVE MAINTENANCE METHODS LTD.

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GEAR OIL, HYDRAULIC OIL, ETC., ANALYSIS REPORT

Associated with
USHER LABORATORIES LIMITED

NEUTRAL — IMPARTIAL — UNBIASED

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
PORT GEAR	BOX	EP3	704 EP3	x	x	x	3											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 TOTAL SERVICE: OIL SERVICE LIFE:

IOL:MARINE DIVN: for CPR - MV CARRIER PRINCESS: The gross metal wear content again shows negligible. There is no significant outside foreign matter. Total insolubles are low at under 0.1%. Viscosity is in the normal region. This oil shows good condition and is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
STBD GEAR	BOX	EP3	732 EP3	x	x	x	2											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 TOTAL SERVICE: OIL SERVICE LIFE:

The gross metal wear content again shows negligible. There is no significant outside foreign matter. Total insolubles are low at under 0.2%. Viscosity is in the normal region. This oil shows good condition and is suitable for continued service.

Expressed in Parts Per Million

UNIT NUMBER	GEAR ASSEMBLY	Original S.A.E. NO.	Present S.A.E. NO.	WATER	GROSS ABRAS.	GROSS METAL	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALUM-INUM	SILI-CON	TIN	SOD-IUM	MAGNE-SIUM	SILVER	NICKEL
BOW THRUSTER	GEAR	APG90	474 90	x	Tr	Tr(1-)	Neg											

SAMPLE DRAWN: Jun 1/74 ANALYSIS MADE: Jun 14/74 TOTAL SERVICE: OIL SERVICE LIFE:

The gross metal wear content is very low. We find no significant outside foreign matter. Total insolubles are low at 0.2%. Oil viscosity is normal. This oil shows good condition and is suitable for continued service.

RED—REQUIRES EARLY ATTENTION

X=NIL

IOL:MARINE DIVN:for CPR:PT GEAR BOX,STBD GEAR BOX & BOW THRUSTER GEAR

UNIT:CARRIER PRINCESS

PAGE:

VISCOSITY

usually increases with use and any contamination. Only excessive viscosity increase requires attention, and the cause will be remarked upon.

METAL WEAR

is indicated in total amount. The amount varies directly with the time in use, or with contamination level. Remarks indicate whether wear is normal or abnormal, and probable cause of above normal wear.

WATER

is a contaminant which increases oil viscosity and metal wear, even in small amounts. Greater amounts of water can be dangerous.

ABRASIVES

are dirt and metal chips. When present in above normal amounts, remarks indicate whether dirt and sand or metal chips form the major part.

ACID INDEX: NEGATIVE to 4 — Normal.
5 to 7 — approaching time to change oil.
8 up — suggest change oil.

CARRIER PRINCESS	PORT GEAR BOX	EP 3	530 EP 3	x	x	x	x	x	2	?	

SAMPLE DRAWN Oct.31/73
ANALYSIS MADE Nov.13/73
CPR) I.O.L.

Gross metal wear content shows negligible this time. We find no signficant outside foreign matter. Total insolubles continue low at under 0.1%. Viscosity shows a little lower but is still within the normal area This oil is suitable for continued servic.e.

CARRIER PRINCESS	STAR.GEAR BOX	EP 3	603 EP3	x	Trace (2)	x	x	Trace	3	22 hrs.	

SAMPLE DRAWN Oct.31/73
ANALYSIS MADE Nov.13/73
I.O.L. FOR CPR

The gross metal wear content shows the same value as the last sample. If the hrs. of service are only 22 and if no internal deposit material is carrying old imbedded gross metal wear chips, then this gross metal wear rate is well above normal. Any further increase would certainly warrant attention to this system, unless you feel new parts are being worn in. We find no significant outside foreign matter. Total insolubles are low at 0.1%. Viscosity is within the normal range. This oil is suitable still for continued service.

SAMPLE DRAWN
ANALYSIS MADE

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
CARRIER PRINCESS POME	40	620 40	0.5	x	x	x	x	2	Neg										

SAMPLE DRAWN: Oct.31/73 ANALYSIS MADE: Nov.13/73 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 2200 hrs.

ENGINE AND OIL CONDITIONS: **ESTIMATED OIL CHANGE PERIOD:**

I.O.L. FOR CPR. CARRIER PRINCESS. All items on the engine show normal here. This oil is suitable for continued service. Oil viscosity still shows some increase but this alone is not of concern. Oil purifier shows good efficiency. Sludge content continues low at 0.1%.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
CARRIER PRINCESS PIME	40	536 40	0.5	x	x	x	x	2	Neg										

SAMPLE DRAWN: Oct.31/73 ANALYSIS MADE: Nov.13/73 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 2200 hrs.

ENGINE AND OIL CONDITIONS: **ESTIMATED OIL CHANGE PERIOD:**

I.O.L. FOR CPR. All items on the engine show normal. This oil is suitable for continued service. Viscosity shows nearer to normal, this time. Oil purifier shows good efficiency. Sludge content continues low at 0.2%.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
CARRIER PRINCESS SOME	40	540 40	0.5	x	x	Tr	x	2	Neg										

SAMPLE DRAWN: Oct.31/73 ANALYSIS MADE: Nov.13/73 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 2200 hrs.

ENGINE AND OIL CONDITIONS: **ESTIMATED OIL CHANGE PERIOD:**

I.O.L. FOR CPR. All items on the engine show normal. Oil viscosity shows lower than the last sample and nearer to normal. This oil is suitable for continued service. Purifier shows good efficiency. Sludge content continues low at 0.1%.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
CARRIER PRINCESS POME	40	620 40	0.5	x	x	x	x	2	Neg										

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CARRIER PRINCESS SOME	40	540 40	0.5	x	x	Tr	x	2	Neg										

SAMPLE DRAWN: Oct.31/73 ANALYSIS MADE: Nov.13/73 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 2200 hrs.

ENGINE AND OIL CONDITIONS: **ESTIMATED OIL CHANGE PERIOD:**

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UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
CARRIER PRINCESS SIME	40	568 40	0.5	x	x	Tr	x	2	Neg										

SAMPLE DRAWN: Oct.31/73 ANALYSIS MADE: Nov.13/73 *TOTAL MILES/HRS. ON UNIT:* ? ON OIL: 2200 hrs.

ENGINE AND OIL CONDITIONS: **ESTIMATED OIL CHANGE PERIOD:**

I.O.L. FOR CPR. All items on the engine show normal here. This oil still shows only a small viscosity increase. Oil is suitable for continued service. Purifier shows godd efficiency. Sludge content continues low at 0.1%.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
CARRIER PRINCESS #1 Aux	30	334 30	0.5	x	x	Tr	x	3	Neg										

SAMPLE DRAWN: Oct.31/73 ANALYSIS MADE: Nov.13/73 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: **ESTIMATED OIL CHANGE PERIOD:**

I.O.L. FOR CPR. All items on the engine show normal here. This oil is suitable for continued use. Oil viscosity is normal. Oil purifier shows good efficiency with sludge content normal at 0.4%.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
CARRIER PRINCESS #2 Aux	30	332 30	0.5	x	x	Tr	x	5	Neg										

SAMPLE DRAWN: Oct.31/73 ANALYSIS MADE: Nov.13/73 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: **ESTIMATED OIL CHANGE PERIOD:**

I.O.L. FOR CPR. The sludge volume is well above normal at over 3% and this consists of an accumulation of normal combustion products. All other items on the engine show normal. Oil shows good in all other respects so that with a considerable improvement in the purifier efficiency to reduce this sludge level the oil will be suitable for continued use.

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UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
CARRIER PRINCESS POME	40	514 40	0.5	x	x	x	x	2	Neg										

SAMPLE DRAWN: Mar.1/74 ANALYSIS MADE: Mar.5/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: ESTIMATED OIL CHANGE PERIOD:

I.O.L. FOR CPR. All items on the engine show normal here. Gross metal wear content is negligible. Sludge volume as Naphtha Insolubles is low at under 0.1%. Oil viscosity shows some increase but not enough for concern. This oil is suitable for continued service.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
PIME	40	556 40	0.5	x	x	x	x	2	Neg										

SAMPLE DRAWN: Mar.1/74 ANALYSIS MADE: Mar.5/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: ESTIMATED OIL CHANGE PERIOD:

All items on the engine show normal here. Gross metal wear content is negligible. Sludge volume as Naphtha Insolubles is low at under 0.1%. Oil viscosity shows some increase but not enough for concern. This oil is suitable for continued service.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
SOME	40	616 50	0.5	x	x	x	x	2	Neg										

SAMPLE DRAWN: Mar.1/74 ANALYSIS MADE: Mar.5/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: ESTIMATED OIL CHANGE PERIOD:

All items on the engine show normal here. Gross metal wear content is negligible. Sludge volume as Naphthat Insolubles is low at under 0.1%. Oil viscosity shows some increase but not enough for concern. This oil is suitable for continued service.

RED—REQUIRES EARLY ATTENTION X-NIL I.O.L. For CPR UNIT: CARRIER PRINCESS PAGE: (1)

Marine Dept. Capt. E. Kreut.

The report form is designed so that the significant results of the report can be determined as quickly as possible. Where no comment is made about an item, it will mean that the item concerned is well within the normal range, that no trend is being established in either direction and that no corrective action is necessary.

Comments and recommendations will be made in cases where a problem is detected.

TEST SEQUENCE No. 1

Includes Physical Properties tests as well as Spectrophotometric Analysis. Physical properties test results are indicated to the left of the bold dividing line in the approximate center of the report form. Spectro Analysis results are indicated to the right of this line.

TEST SEQUENCE No. 2

Includes Physical Properties tests only.

SPECTROPHOTOMETRIC ELEMENTS are expressed in parts per million; The number 50, for example, under any Spectrophotometric Element heading means that 50 parts per million of the element has been detected in the sample.

NOTE:—If Spectro Analysis is desired, be sure that Test Sequence No. 1 is checked off by the person filling out the data slip provided with the sample jar.

ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive
   (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

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DIESEL FUELED EQUIPMENT | 6813 KINGSWAY, BURNABY 1, B.C. | TELEPHONE 521 - 0234

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
SIME	40	576 40	0.5	x	x	x	Tr	2	Neg										

SAMPLE DRAWN: Mar.1/74 ANALYSIS MADE: Mar.5/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: ESTIMATED OIL CHANGE PERIOD:

I.O.L. FOR CPR: CARRIER PRINCESS. All items on the engine show normal here. Gross metal wear content is negligible. Sludge volume as Naphtha Insolubles is low at under 0.1%. Oil viscosity shows some increase but not enough for concern. This oil is suitable for continued service.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
#1 GEN	Tromar 30	416 40	0.5	x	x	Tr	x	2	Neg										

SAMPLE DRAWN: Mar.1/74 ANALYSIS MADE: Mar.5/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: ESTIMATED OIL CHANGE PERIOD:

All items on the engine show normal here. Gross metal wear rate shows negligible. Sludge volume as Naphtha Insolubles is low at under 0.1%. Oil viscosity shows a moderate increase but not yet enough for concern. This oil is suitable for continued service.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
#2 GEN	Tromar 30	394 40	0.5	x	x	Tr	x	2	Neg										

SAMPLE DRAWN: Mar.1/74 ANALYSIS MADE: Mar.5/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: ESTIMATED OIL CHANGE PERIOD:

All items on the engine show normal here. Gross metal wear rate shows negligible. Sludge volume as Naphthak Insolubles is low at under 0.1%. Oil viscosity shows a moderate increase but not yet enough for concern. This oil is suitable for continued service.

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Includes Physical Properties tests only.

SPECTROPHOTOMETRIC ELEMENTS are expressed in parts per million; The number 50, for example, under any Spectrophotometric Element heading means that 50 parts per million of the element has been detected in the sample.

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ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive
   (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
Slight (Sl).....above normal.
Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

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UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
#3 GEN	Tromar 30	432 40	0.5	x	x	Tr	x	3	Neg										

SAMPLE DRAWN: Mar.1/74 ANALYSIS MADE: Mar.5/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: ESTIMATED OIL CHANGE PERIOD:

I.O.L. FOR CPR; CARRIER PRINCESS. All items on the engine show normal here.The sludge volume as Naphtha Insolubles has risen to 0.5% which is considered to be the upper part of the normal range. This consists of normal combustion products. Oil viscosity shows a moderate increase but not enough for concern. This oil shows good condition ~~and~~ in all other respects and with a small improvement in the purifier efficiency this oil will be suitable for continued service.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
EMERG.GEN	Tromar 30	340 30	1.0	x	x	x	x	2	Neg										

SAMPLE DRAWN: Mar.1/74 ANALYSIS MADE: Mar.5/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: ESTIMATED OIL CHANGE PERIOD:

All items on the engine show normal here. Gross metal wear content shows negligible. The sludge volume expressed as Naphtha Insolubles is low at under 0.1%. Oil viscosity shows some increase but not enough for concern. This oil shows good condition and is suitable for continued service.

UNIT NUMBER	S.A.E. USED	S.A.E. NOW	% FUEL DIL.	WATER	FUEL SOOT	GROSS ABRAS.	GROSS METAL	SLUDGE INDEX	ACID INDEX	IRON	CHRO-MIUM	COPPER	LEAD	ALU-MINUM	SILI-CON	TIN	SO-DIUM		
BOW THRUSTER ENGINE	Tromar 30	386 30	0.5	x	x	Tr	Tr	5	Neg										

SAMPLE DRAWN: Mar.1/74 ANALYSIS MADE: Mar.5/74 *TOTAL MILES/HRS. ON UNIT:* ON OIL:

ENGINE AND OIL CONDITIONS: ESTIMATED OIL CHANGE PERIOD:

Gross metal wear content is low. Other items on the engine show normal. The sludge volume is well above the recommended level at 4% expressed as Naphtha Insolubles. This consists chiefly of normal combustion products. Oil viscosity shows some increase but not enough for concern. This oil shows good in all other respects so that with a considerable ~~improve~~ increase in the purifier efficiency to reduce the sludge level this oil will be suitable for continued service.

RED—REQUIRES EARLY ATTENTION X-NIL I.O.L. for CPR UNIT: CARRIER PRINCESS PAGE: (3)

MARINE DEPT: CApt. E. Kreut.

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ACTION DESIRABLE IF:

1. S.A.E. No. Changes two grades.
2. Fuel dilution 4% or more.
3. Water present in free form.
4. Fuel soot slight.
5. Gross abrasives Slight or Heavy.
6. Gross metal Heavy.
7. Sludge 5 or over.
8. Metal wear rates excessive (this is dealt with in remarks due to variations in normal wear rates with different pieces of equipment and service conditions).

SLUDGE INDEX NUMBERS

1. Nil
2. Trace amounts-normal
3. Normal
4. A bit above normal.
5. Requires attention.
6. Bad-requires attention.
7. Dangerous—requires attention.
8. Extremely dangerous — requires attention.

TERMS: X Negligible amount.

Trace (Tr).....normal amount.
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Heavy (Hvy).....requires attention.

ACID INDEX:

Most new oils have a Negative Index No. Any Positive Index Number indicates acid has been formed: The Index Number indicates the severity of the acid formation.

ACID INDEX NUMBER

Negative, O — Normal

1.
2. — Oil beginning to break down.
3.

4.
5. — Change Oil Now.
6.

7. — Urgent, Change Oil.
8.

PREVENTIVE MAINTENANCE METHODS LTD.

Associated with
USHER LABORATORIES LIMITED

Gear Oil, Hydraulic Oil, Etc., Analysis Report

NEUTRAL — IMPARTIAL — UNBIASED

UNIT NUMBER	Gear Assembly	Original S.A.E. No.	Present S.A.E. No.	Naphtha Insolubles	Evidence of Steel Wear	Evidence of Bushing Alloy Wear	Water and Emulsion	Dirt or Abrasives	Acid Index	Period This Oil Ran
CARRIER PRINCESS	Bow Thruster Gear Box	?	560 90	x	Trace (1-)	x	x	Trace	Neg	?

SAMPLE DRAWN Mar.1/74
ANALYSIS MADE Mar.5/74

Gross metal wear content is very low. We find no significant outside foreign matter. Totaxl insolubles are low at only 0.2%. The viscosity is in the SAE 90 range but with data on the oil brand a further comparison of viscosity change could be offered.

ER IOL FOR CPR

	Port Gear Box	EP3	692 EP3	x	x	x	x	x	1	-

SAMPLE DRAWN Mar.1/74
ANALYSIS MADE Mar.5/74

Gross metal wear content is so low as to be considered negligible this time. There is no significant outside foreign matter. Total insolubles are low at under 0.1%. Viscosity is within the normal range. This oil shows good condition and is suitable for continued service.

	Star.Gear Box	EP3	712 EP3	x	Trace (1-)	x	x	x	2	-

SAMPLE DRAWN Mar.1/74
ANALYSIS MADE Mar.5/74

Gross metal wear content is very low. There is no significant outside foreign matter. Total insolubles are low at under 0.1%. Oil viscosity shows some increase but not enough for concern. This oil is considered suitable for further service.

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

RED—REQUIRES EARLY ATTENTION

X—NIL

I.O.L. For CPR CARRIER PRINCESS
MARINE DEPT. Capt. E. Kreut.

UNIT: Gear Oils

PAGE:

VISCOSITY

usually increases with use and any contamination. Only excessive viscosity increase requires attention, and the cause will be remarked upon.

NAPHTHA INSOLUBLES

indicate the presence of varnish-type material. Main causes are hot operation, excessive pressure (from high load, misalignment, etc.), or incorrect grade of oil.

METAL WEAR

is indicated in total amount. The amount varies directly with the time in use, or with contamination level. Remarks indicate whether wear is normal or abnormal, and probable cause of above normal wear.

WATER

is a contaminant which increases oil viscosity and metal wear, even in small amounts. Greater amounts of water can be dangerous.

ABRASIVES

are dirt and metal chips. When present in above normal amounts, remarks indicate whether dirt and sand or metal chips form the major part.

ACID INDEX: NEGATIVE to 4 — Normal.
5 to 7 — approaching time to change oil.
8 up — suggest change oil.

PREVENTIVE MAINTENANCE METHODS LTD.

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Associated with
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Gear Oil, Hydraulic Oil, Etc., Analysis Report

NEUTRAL — IMPARTIAL — UNBIASED

UNIT NUMBER	Gear Assembly	Original S.A.E. No.	Present S.A.E. No.	Naphtha Insolubles	Evidence of Steel Wear	Evidence of Bushing Alloy Wear	Water and Emulsion	Dirt or Abrasives	Acid Index	Period This Oil Ran
MS CARRIER PRINCESS	Port Red.	Spartan EP3	748 EP3	x	Trace (1-)	x	x	x	0	660 hrs.

SAMPLE DRAWN July 16/73
ANALYSIS MADE July 23/73
I.O.L. Marine Dept.

The gross metal wear content shows low in this oil sample. The spectrophotometric analysis shows Iron 36 ppm; Chromium 8 ppm; Nickerl 40.6 ppm; Manganese 20 ppm; Copper 5½ ppm; Lead 57 ppm; Aluminum 5 ppm; Sodium 16 ppm. This strongly indicates that the ferrous metal wear material found here is of high grade steel and is considered to be from the gears themselves. This is certainly not consistent with cast iron from the housing. We find no significant outside foreign matter. Total insolubles are low at 0.1%. The viscosity is normal. Oil shows good condition and from this viewpoint is suitable for longer service. Sodium value is normal and indicates no salt water contamination. &

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

RED—REQUIRES EARLY ATTENTION

X—NIL

I.O.L. Marine Dept.
Att: Capt. E. Kreut

UNIT:

PAGE:

VISCOSITY

usually increases with use and any contamination. Only excessive viscosity increase requires attention, and the cause will be remarked upon.

NAPHTHA INSOLUBLES

indicate the presence of varnish-type material. Main causes are hot operation, excessive pressure (from high load, misalignment, etc.), or incorrect grade of oil.

METAL WEAR

is indicated in total amount. The amount varies directly with the time in use, or with contamination level. Remarks indicate whether wear is normal or abnormal, and probable cause of above normal wear.

WATER

is a contaminant which increases oil viscosity and metal wear, even in small amounts. Greater amounts of water can be dangerous.

ABRASIVES

are dirt and metal chips. When present in above normal amounts, remarks indicate whether dirt and sand or metal chips form the major part.

ACID INDEX: NEGATIVE to 4 — Normal.
5 to 7 — approaching time to change oil.
8 up — suggest change oil.

PREVENTIVE MAINTENANCE METHODS LTD.

6813 KINGSWAY, BURNABY 1, B.C.
TELEPHONE: 521-0234

Associated with
USHER LABORATORIES LIMITED

Gear Oil, Hydraulic Oil, Etc., Analysis Report

NEUTRAL — IMPARTIAL — UNBIASED

UNIT NUMBER	Gear Assembly	Original S.A.E. No.	Present S.A.E. No.	Naphtha Insolubles	Evidence of Steel Wear	Evidence of Bushing Alloy Wear	Water and Emulsion	Dirt or Abrasives	Acid Index	Period This Oil Ran
MS CARRIER PRINCESS	Port Red.	Spartan EP3	748 EP3	x	Trace (1-)	x	x	x	0	660 hrs.

SAMPLE DRAWN July 16/73
ANALYSIS MADE July 23/73
I.O.L. Marine Dept.

The gross metal wear content shows low in this oil sample. The spectrophotometric analysis shows Iron 36 ppm; Chromium 8 ppm; Nickerx 40.6 ppm; Manganese 20 ppm; Copper 5½ ppm; Lead 57 ppm; Aluminum 5 ppm Sodium 16 ppm. This strongly indicates that the ferrous metal wear material found here is of high grade steel and is considered to be from the gears themselves. This is certainly not consistent with cast iron from the housing. We find no significant outside foreign matter. Total insolubles are low at 0.1%. The viscosity is normal. Oil shows good condition and from this viewpoint is suitable for longer service. Sodium value is normal and indicates no salt water contamination. &

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

RED—REQUIRES EARLY ATTENTION

X—NIL

I.O.L. Marine Dept.
Att: Capt. E. Kreut

UNIT:

PAGE:

PREVENTIVE MAINTENANCE METHODS LTD.

6813 KINGSWAY, BURNABY 1, B.C.
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USHER LABORATORIES LIMITED

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NEUTRAL — IMPARTIAL — UNBIASED

UNIT NUMBER	Gear Assembly	Original S.A.E. No.	Present S.A.E. No.	Naphtha Insolubles	Evidence of Steel Wear	Evidence of Bushing Alloy Wear	Water and Emulsion	Dirt or Abrasives	Acid Index	Period This Oil Ran
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ANALYSIS MADE July 23/73
I.O.L. Marine Dept.

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SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

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ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

SAMPLE DRAWN
ANALYSIS MADE

RED—REQUIRES EARLY ATTENTION

X—NIL

I.O.L. Marine Dept.
Att: Capt. E. Kreut

UNIT:

PAGE: