Carrier INTER-OFFICE LETTER

CONFIDENTIAL

TO	W. A. BARNES	ATLANTA	A	**FROM**	M. A. RIVARD	**DATE**	11/1/62
	P. E. ROSS	CHICAGO	A				
	C. R. STEELE	CLEVELAND	A	**OFFICE**	DIRECT SERVICE ENGINEERING, SYRACUSE		
	C. D. TERRELL	DALLAS	A				
	H. A. JOHNSON	LOS ANGELES	A	**SUBJECT**	FIELD EXPERIENCE REPORT #16 6-2-7		
	E. M. TANGEL	NEW YORK	A		OIL LOSS		
	J. B. CHIOLINO	PHILADELPHIA	A		19C CENTRIFUGAL		
	H. A. ADAM	TORONTO	A				
	R. W. VAN DERPOOL	CIL-NEW YORK	A				
	J. MOSES	ATLANTA	B				
	W. H. GUNTHER	CHICAGO	B		W. GROTH	G.S.	C
	R. T. MITCHELL	CLEVELAND	B		C. D. MILLER	TR-7	C
	L. N. FRICK	DALLAS	B		R. S. MUSSEY	G.S.	C
	H. GRIFFIN	LOS ANGELES	B		H. W. SIBLEY	TR-7	C
	R. B. BARNES	NEW YORK	B		M. A. SCICCHITANO	TR-7	C
	J. R. SOISSON	PHILADELPHIA	B		J. S. STYRON	TR-1	C
	J. JAMIESON	TORONTO	B		W. J. WREN	TR-7	C
	F. E. DUNN	CIL-NEW YORK	B				

The purpose of this letter is to review the oil loss problem and forward recommended field corrections when oil loss is experienced on field machines.

Background

The oil loss being discussed here is restricted only to the standard line R-113 machine (19C3, 4, 5) having the latest (design #3) bearing design. This bearing design is found on Page 213 of the 19C Parts Catalog.

Field reports last year indicated that under certain conditions, oil is lost at the main bearing felt rings. Since the drain has been removed between motor shell and oil reservoir, your first evidence of excessive oil loss will be oil accumulation in the bottom of the motor shell.

A series of tests were conducted in Syracuse on a 19C4 machine and various field operating conditions duplicated. The results of these tests are listed as follows:

1. Sudden oil loss resulted at the main bearing felt ring on machine recycle with the oil pump running.

2. Oil loss resulted during machine operation at the felt rings and/or split line Gask-O-Seal if these components are fitted improperly.

3. Sudden oil loss resulted at the bottom felt ring at start-up with the oil reservoir temperature at 100 - 120 F. with over 10% refrigerant in oil by weight and with the water shut off to the oil cooler.

4. Sudden oil loss at the felt rings and rotor reversal was experienced when the compressor was shutdown when operating at wide open vanes with a relatively high head pressure and with the oil pump running.

Basically, therefore, there are two type of oil loss that can be experienced on these size machines. A sudden loss (1/2 - 1-1/2" in the oil reservoir) occurring under conditions 1, 3, and 4 above, or a slow steady loss during machine operation caused by condition #2 above.

To combat the sudden loss, which is by far the most serious, the control wiring diagram was revised to recycle the oil pump with the compressor. This was tried with good results on several field machines that have previously lost oil as well as on the test machine.

Syracuse Action

A change is in process to change the control diagram on 19C machines to shut down the oil pump whenever the compressor recycles. This change is part of a major purge and control wiring change and will be more fully explained later.

In addition, one other change has been processed which will be effective in November 1962. It includes the addition of:

(a). A 3/16" drill thru hole on the bottom of each lower felt groove to aid in oil drainage at the felt ring.

(b). A reducer bushing and a 3/4" NPT pipe plug in the core hole in the bottom of the pedestal on the motor end.

(c). A #10-24 x 1/2" long pan head screw to hold the Gask-O-Seal in place at the split line.

Items (a) above is not a recommended field fix because it requires removal of the rotor. Item (b) also is not a recommended field fix since it is impossible to remove the core plug and install the bushings without removing the bearing pedestal. Installing a vent line from this core opening to the pipe plug opening (through which the oil return orifice is drilled) at the top of the bearing cap proved effective in

eliminating sudden oil loss on the test machine but is difficult to install in the field and the same results can be accomplished by changing the oil pump wiring. The bushing and 3/4" pipe plug opening will be available on factory R-113 machines next month and can be used to supplement the wiring changes if required.

A single pan head screw (#10-24 x 1/2" lg.) and a #10 lockwasher will be used on each Gask-O-Seal. A 3/8" drilled hole is provided on the Gask-O-Seal halves with a corresponding counter-sunk hole in the bearing cap to take the pan head. (See attached sketch).

You may ask "why are only the R-113 machines affected with this type of sudden loss?" The test results show that on recycle with the oil pump running, the lower pressure in the reservoir and the slightly higher pressure in the motor shell approach each other and even reverse themselves momentarily. Refrigerant gas traveling from the condenser, through the compressor and through the vent line into the reservoir raises the reservoir pressure. This causes oil and foam within the bearing chamber to "stack up" and flow out the felt rings. Oil has a greater affinity to absorb R-113 than R-11 and R-113 has a higher specific volume than R-11. This means that any sudden pressure change on R-113 machines releases more refrigerant gas in the oil, and hence more foaming which can leak pass the felt seal rings.

Field Action

The greatest oil loss will be experienced when the machine recycles during marginal weather. This marginal period is approaching us and you can probably expect an increase in oil loss complaints. Not every R-113 machine will lose oil since oil loss will depend on particular operating conditions mentioned earlier. We are recommending corrections on only those R-113 machines where oil loss persists or where the customer requests corrections. You will have to use good judgement to determine "excessive" loss and "normal" loss. Loss of four (4) gallons during one operating season, in my opinion, can be considered "normal" and should be no cause for alarm on most jobs.

When excessive oil loss is reported, the following is recommended:

1. Revise the control wiring to recycle the oil pump per the attached diagram which includes the following:

   (a). Relocating the oil pressure switch and the M3 auxiliary contact.

   (b). Relocating the oil cooler solenoid valve to recycle with the pump. (Test showed that on start-up after recycle, oil foaming was minimized when water was admitted to the oil cooler; this "pre-cools" the oil before it goes to the bearing resulting in less refrigerant flashing in the bearing itself.)

(c). The addition of the anti-recycle timer in the starter to prevent rapid recycling of the oil pressure switch in its new location.

Two contacts are required on the R_2 relay. These are to keep the oil pump and the auxiliary pumps running should the 1CR relay stay closed keeping the machine on the line after the STOP button is depressed. Order an R_1 relay from Service Parts and call it the R_2. The single contact R_2 relay then becomes the RF relay and is used to recycle the oil pump. Refer to the attached wiring diagram.

2. Install an anti-recycle timer in the starter and wire in accordance with the schematic on the right hand side of the wiring diagram. Refer to W. Humm's letter dated 4/25/61 for recommended timers and their wiring schematics.

3. Replace the lower and upper felt sealing rings on the main bearing. Before replacing the felt rings however, examine the existing rings for proper compression against the shaft. The felt ring that is still white in color means that it was not contacting the shaft properly and it may mean that the felt ring grooves are machined too deep or that improper felt ring compression is available. Examine the felt to be sure that there is no gap at the split line that can cause oil bypass. The split line Gask-O-Seal should be examined carefully and replaced if any visual defects are found. Secure the Gask-O-Seal with a pan head screw per the attached sketch.

Machine Service Records

Each Region must keep track of those machines with the modified wiring arrangement so that years from now, the proper relay can be purchased from Service Parts if a relay failure occurs. Individual service records will have to be controlled by the field and along these lines the following is recommended as a minimum:

1. The Regional Service Records and master Service Parts list must be noted to reflect these changes.

2. The Region is to notify Service Parts, attention Mr. W. Groth, Syracuse, New York of those machines that are modified so that the individual job Bill of Materials can reflect these changes.

3. The service mechanic making the wiring change must note the customer's Service Parts List to reflect this change also.

The items in this oil loss correction that affects Service Parts are the relays and the anti-recycle timer. The customer's parts catalog has to be marked up showing the change in the R2 relay and the addition of the RF relay. The manufacturer's part number for the anti-recycle timer can also be added to the customer's parts list.

Several copies of the following attachments are included with the Service Engineer's copy of this letter for the mechanics use and including the following:

(a). Standard 19C Control Diagram - 19C-201-E1 Rev. C.

(b). 19C Control Diagram "Special" showing the wiring changes. (The pneumatic control diagram change is identical to the electronic diagram).

(c). Sketches showing the installation of the Gask-O-Seal and how it is held on the pedestal.

(d). Itemized instructions on how to change the wiring in the console.

M. A. RIVARD

MAR/ao'r

Attachments

WIRING MODIFICATION
19C HERMETIC CENTRIFUGAL

PURPOSE:

To revise the wiring arrangement to recycle the oil pump with the compressor and to add an anti-recycle timer in the starter for additional motor protection.

REFERENCES:

19C Control Diagram 19C-201-E1 Revision C (or 19C-201-P1) and "Special" Control Diagram showing revisions.

PROCEDURE:

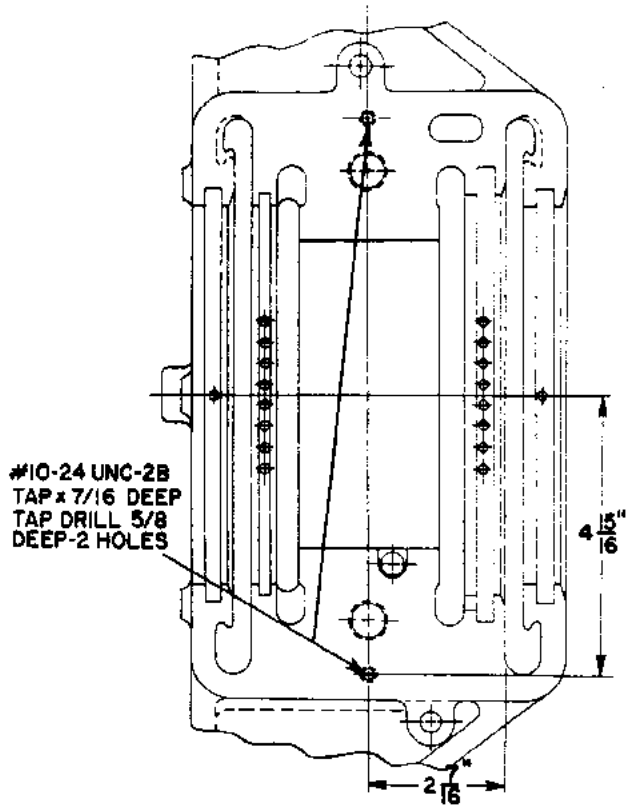
1. Remove wire between "auto" terminal of oil pump switch and terminal [48].
2. Relocate oil cooler solenoid valve by removing wire (79) on terminal [18] and installing it on terminal [6].
3. Re-designate the R_2 relay as the RF relay. Wire the coil to terminal [V1] and [2]. Wire the normally open contact to terminal [1] and [6].
4. Install a new R_2 relay with two normally open contacts. (An R_1 relay can be purchased and re-designated as R_2). Wire one N.O. contact between terminal [1] and the "auto" terminal of oil pump switch and the other N.O. contact between terminals [1] and [48].
5. Disconnect wire (75) from terminal [V1].
6. Disconnect wire (67) from terminal [44] and reconnect to terminal [V1].
7. Disconnect wire (68) from chilled water pump auxiliary contact M5 in pump starter.
8. Connect new wire from terminal [44] to auxiliary contact M5 in chilled water pump starter.
9. Disconnect oil pressure switch (wires (71) and (72)) from terminals [45] and [46]. Install a wire jumper between terminals [45] and [46].
10. Connect wire (68) from oil pump starter M3 contact to wire (71) from oil pressure switch.
11. Connect wire (75) disconnected from [V1] in step 5 above and connect it to wire (72).
12. Disconnect the low oil pressure indicating light from terminal [46] and reconnect to junction of wires (72) and (75).

When wiring is completed, operate the compressor, noting the operation of the oil pump, auxiliary contact and oil pressure switch. Trip the chilled water recycle switch manually and be sure the oil pump shuts down with the compressor.

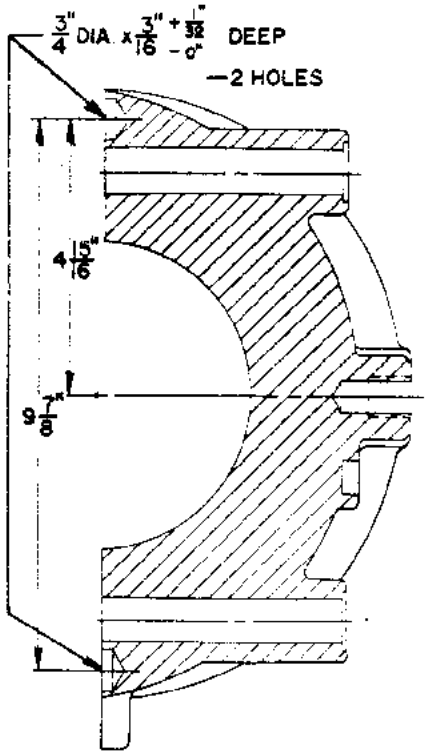
In addition, install an anti-recycle timer in the starter and wire it as shown under Note 6 of the wiring diagram or from a diagram obtained from the Carrier Service Engineer.

Submit the revised wiring diagram to the customer's operating engineer and mark up his 19C Service Parts Catalog to indicate the new relay designation, and their part numbers. Add the manufacturer's part number of the anti-recycle timer to the customer's starter manual.

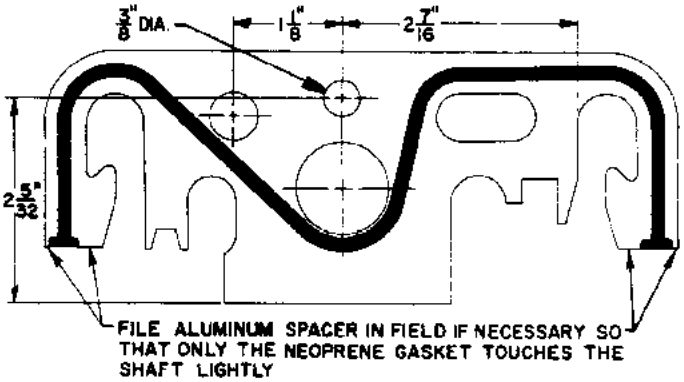
M. A. RIVARD
11/1/62
/ao'r



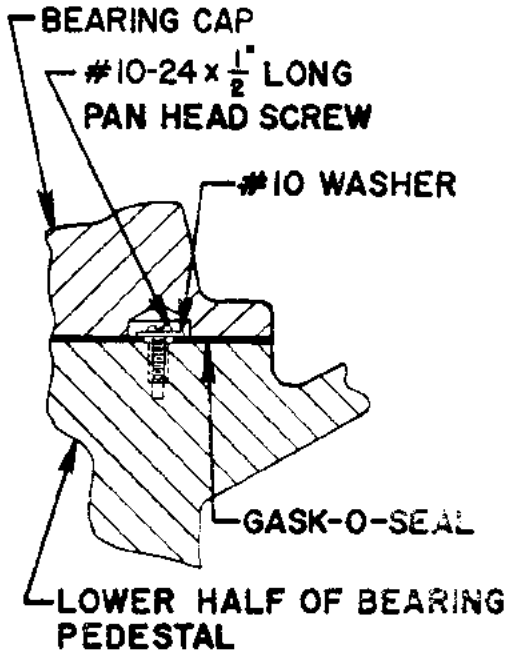
LOWER HALF OF BEARING PEDESTAL



BEARING CAP



GASK-O-SEAL



INSTALLATION DETAILS

SKETCH NO. 1
HOLDING THE GASK-O-SEAL IN PLACE