Carrier Machinery and Systems Division
Carrier Corporation

factory service operations

SUBJECT: 19EA,FA SENSORS

F.E.R. 78- 4

"A" BRANCH SERVICE MANAGERS

"B" DISTRICT SERVICE MANAGERS

"C" ZONE TECHNICAL STAFF

DATE: JANUARY 12, 1979

OFFICE: MSD SERVICE OPERATIONS - NEW YORK

FROM: DON CARLSON

SUBJECT: 19EA, FA SENSORS

F.E.R. 78-4

PURPOSE: To provide a procedure for troubleshooting bearing and motor sensors.

MACHINES AFFECTED: All 19EA,FA Machines.

COMMENTS:

Recent feedback from the field has indicated that nuisance machine shutdowns on bearing and/or motor sensors are occurring at a higher than normal rate.

Accordingly, a new design bearing sensor is available thru Service Parts. The major advantage of the new sensor is that heat shrink has been added to the wires to retard motion.

On some installation, additional procedures have been required to eliminate machine tripouts. Attached is a procedure to help rectify the situation.

REGARDS,

Don

DON CARLSON

DC/iam

ATTACHMENT:

FILING INSTRUCTIONS: F.E.R. BOOK - CENTRIFUGAL
TAB: CONTROLS

1.0 GENERAL

1.1 This Bulletin is directed toward machines experiencing several nuisance shutdowns, normally without tripping the circuit breakers on the Design 1 control panel. If a machine has tripped a circuit breaker (CB1 or CB2) or one of the sensor indicating lights is energized (Design 2 panel), the safety precautions outlined in section 2.0 should be followed.

2.0 INDICATION OF SHUTDOWN SYMPTOM

2.1 When a machine trips one of the control panel circuit breakers or energizes one of the sensor indicating lights, the following areas should be checked:

2.1.1. Defective Sensors - Check the resistance reading across the sensor. The resistance - temperature relationship shown in Sketch #1 should be evident if the sensor is functioning properly. The bearing, motor, and discharge sensors (if applicable) should be checked.

2.1.2. Defective impeller displacement switch - check the resistance across the switch. An open circuit indicates a faulty displacement switch.

NOTE: The new displacement switch (P/N19EA412-1114) has its wires routed thru copper tubing to prevent nuisance trips due to broken wires.

2.1.3. Defective Control Modules - P/N HN65BJ002, HN65BJ003. Check operation of coil and contacts using a 120 volt circuit.

2.1.4. Control Transformers - Check secondary side of transformer for 24 vac.

2.1.5. Proper Grounding - Stray voltages can affect the modules. Check the following:

2.1.5.1. The machine is properly grounded.
2.1.5.2. The "LL2" side of the 120 V control circuit is properly grounded.
2.1.5.3. Terminal "23" is properly grounded.
2.1.5.4. No stray voltages exist on or around the control panel.

2.2 If all the above areas check satisfactory, the machine should be checked for internal damages. However, don't overlook the fact that the machine may have actually shut down on the safety as intended and a operating problem exists (overheating for example).

3.0 NUISANCE TRIPOUTS

3.1 If the machine shuts down without any indication of the trouble area, the proceding outline should be used as a guide.

3.1.1. If a Safety Indicating Panel is available, connect it into the circuit. This may help determine whether the bearing sensor circuit or motor sensor circuit is at fault. Up til now, the bearing sensor has been the number one culprit.

3.1.2. To determine precisely if a certain sensor is faulty, connect a 75 ohm, 1/2 watt resistor in place of the sensor. This connection will provide a constant signal to the module. Start the machine and closely monitor the operation. If no tripout occurs, the problem can be traced to that particular sensor. While performing this test, you should also monitor the resistance reading of the particular sensor, using a Simpson Meter. Note any changes.

NOTE: A variable resistor is also a good method to check the operation and cut-out points of the control modules.

4.0 FIELD MODIFICATIONS

4.1 Bearing Sensors

4.1.1. The current part numbers are:

19EA:	19EA41-206	(no heat shrink tubing)
	17FA502-402	(with heat shrink tubing)
19FA:	17FA402-402	(13.5" long leads)
	17FA502-402	(15.0" long leads)

On installation, make sure leads have heat shrink tubing. The part number for heat shrink tubing is 17FA422-1271 (1/8 I.D. x 3" long).

4.1.2. Use Loctite liberally on the wire connections into the sensor.

4.1.3. If sufficient slack is available, attach the leads to existing oil tubing, using wire ties. This will further retard the sensor wires from swaying.

4.2 MOTOR SENSORS

4.2.1. Both the 19EA and 19FA stators contain four (4) sensors; two (2) embedded in the slots and two (2) embedded into the windings. Only two (2) sensors are used, one from each location. If a sensor is faulty, an additional sensor from either location may be substituted. The wires from the additional sensors should be accessible by removing the motor sensor terminal cover assembly located on the end of the motor shell.

4.2.2. If new sensors are required, contact Zone Service Engineering for the recommended installation procedure.

5.0 ADDITIONAL CHECKS

5.1 Check the following - let's not overlook the obvious:

5.1.1. Transformer output - must be 24 vac.

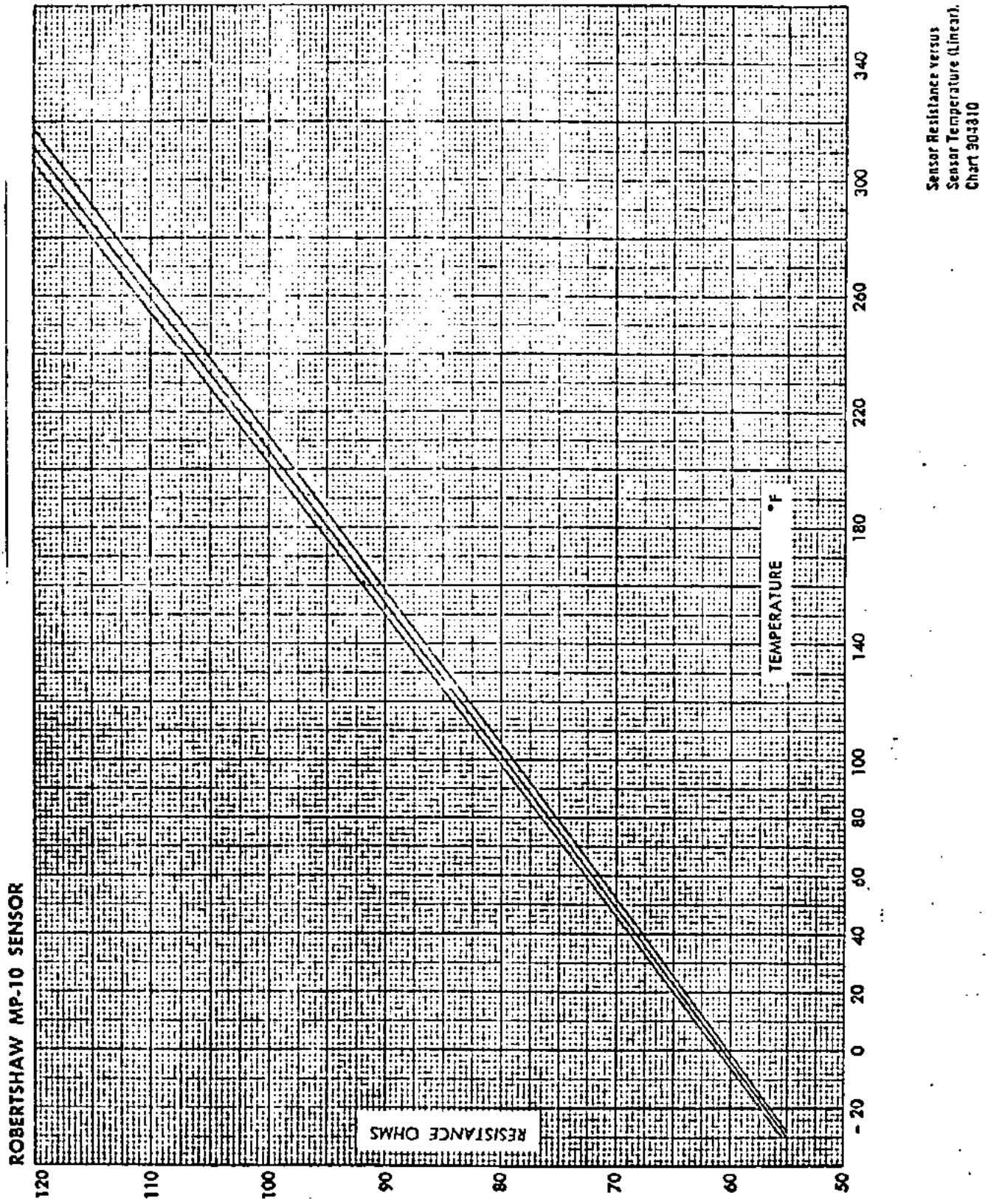
5.1.2. High oil levels - F.E.R. 77-10. This is must pronounced on machines without gear shrouds.

5.1.3. Faulty K1 or K4 Relays - best indication is that the "Start" light will go out during attempted start-up.

5.1.4. Loose wire connections.

19EA BEARING, DISCHARGE, AND MOTOR SENSORS

PERFORMANCE CHARACTERISTICS:



Sensor Resistance versus
Sensor Temperature (Linear).
Chart 304310

ATTACHMENT

F.E.R. 78-4

1/12/79

To: ALAN JOHNSON
CBS - SYRACUSE TR-7A

BOB ROMANO
CBS - SYRACUSE TR-7A

cc: BILL CAMP
CBS - ATLANTA

ANDY VERECKEY
CBS - CHARLOTTE

Date: SEPTEMBER 21, 1982

From: NICK CHASHIN

Office: CBS - CHARLOTTE SERVICE ENGINEERING

Subject: 19EA, FA BEARING MODULE
NUISANCE TRIP-OUTS

F.Y.I. No comments

SEP 24 1982

To eliminate the problem of the nuisance trip-outs on the bearing module is to rewire the impeller displacement switch in series with the bearing or discharge sensor, (See Attached).

The problem with nuisance trips is due to two grounds applied to the module. One through the power supply, (impeller displacement switch), and the other through the sensors, (ie: Nicks in the wires, stray voltages, etc.). This will cause an unbalance in the D.C. voltage circuit, thus, causing the relay inside the module to drop out and pick up instantaneously.

We had two jobs, one 19EB still under warranty, (see attached), and the 19FA which had all wires, both sensors, impeller switch and transformer replaced without success. I modified the wiring and we have not had one trip-out since. This modification was applied after I set up a test stand in my laboratory and grounding the sensor through the impeller displacement switch, it did not affect the performance of the sensor nor the module.

After I performed the wiring change, I received a new style module from Dave Greer which I am returning to Bob with the following comments:

1. It is not a direct replacement, but physically much larger, therefore, it will require a lot of wiring splicing.

2. It requires the stocking of two different modules, (motor and bearing).

3. My Reciprocating Mechanic tells me that this new module Guard-Pak II is used on all Trane Reciprocating units and they are forever replacing them.

To rewire the impeller displacement switch in series with a sensor will take less than 15 minutes.

Regards,

NC:tm

Attachment

TO : MR. V.A. OSBORNE
FROM: R.J. RYERSON
SUBJECT: 1PEA BEARING/MOTOR MODULES

/
.E,

REGARDING YOUR JULY 15 LETTER TO PETE HOLENCHAK ON THE SUBJECT, WE HAVE EXPERIENCED A NUMBER OF TRIPS ON IMPELLER DISPLACEMENT, AND, AFTER REPLACEING THE SWITCH, WHICH HAD NOT TRIPPED, EVENTUALLY EXPERIENCED THE SAME PROBLEM. LAST TIME AROUND ON TWO JOBS, WE DISASSEMBLED THE SWITCH, MADE A 3/16" LONG SPACER TO DECREASE THE SPRING LENGTH AND APPROXIMATELY DOUBLE THE SPRING PRESSURE. THESE JOBS WERE MODIFIED THIS PAST SHUTDOWN SEASON, AND AS YET WE HAVE HAD NO OTHER TRIPS.

I BELIEVE THE PROBLEM IS EITHER BOUNCING OF THE SWITCH, OR AN OIL FILM BUILT UP BETWEEN THE PLUNGER AND THE TOGGLE WITHIN THE SWITCH. WE MEASURED CONSIDERABLE RESISTANCE ACCROSS ONE OF THE FAILED SWITCHES, CLEANED IT IN SOLVENT AND DRIED IT OUT, AND MEASURED THE RESISTANCE AGAIN, WHICH WAS THEN 0.

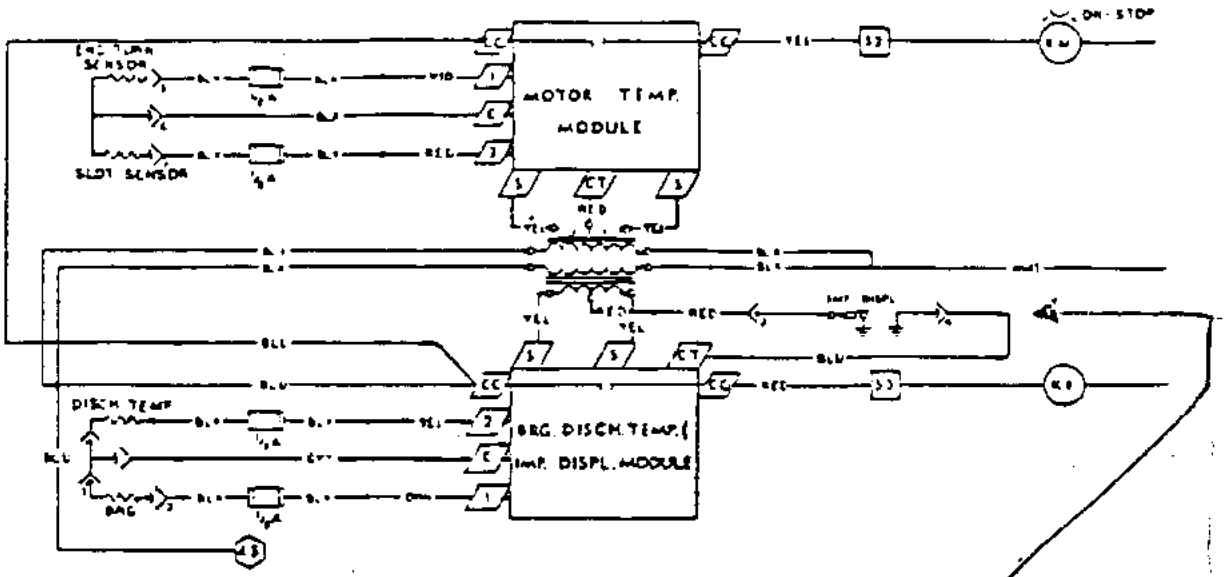
I SHOULD ALSO ADD THAT THIS MODIFICATION WAS MADE AFTER ALL THE OTHER FIXES HAD BEEN PERFORMED, IE SECURING INTERNAL WIRING, SOLDERING ALL CONNECTIONS, INSTALLING RESISTORS TO ELIMINATE THE TEMPERATURE SENSORS, ETC. WE HAD NARROWED IT DOWN TO THE DISPLACEMENT SWITCH.

I ASSUME NICK ACCOMPLISHED ESSENTIALLY THE SAME THING BY PLACING THE SWITCH IN A CIRCUIT THAT IS MORE TOLERANT OF RESISTANCE CHANGE AND INTERMITENT BOUNCING OF THE CONTACT.

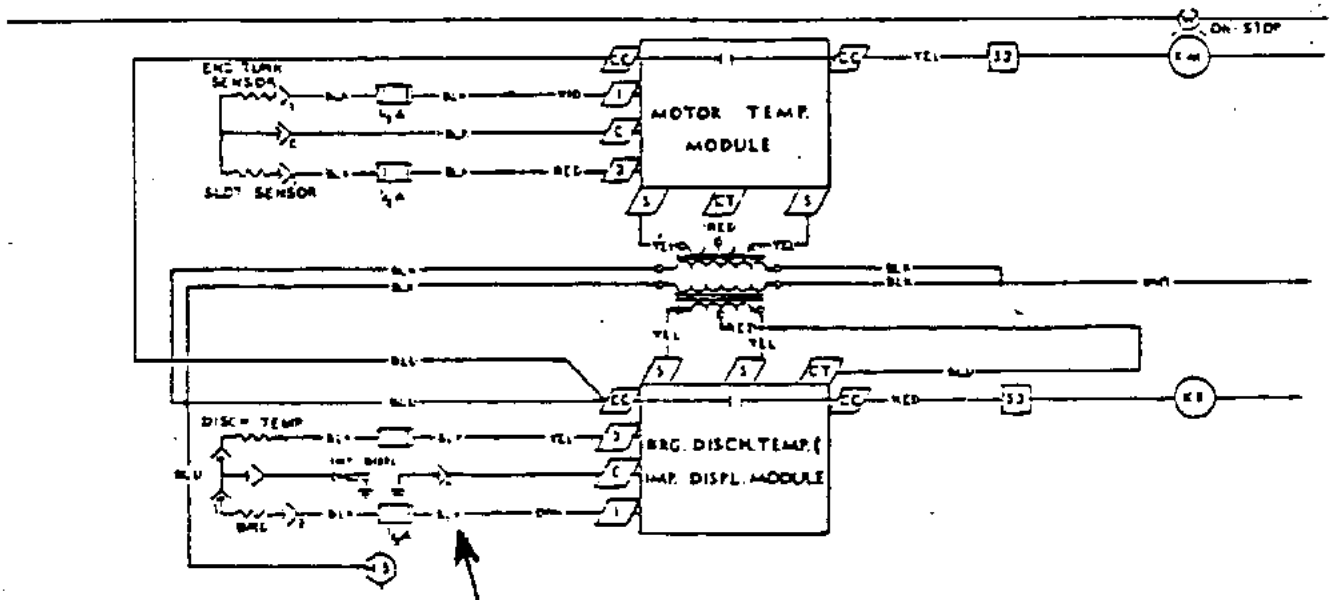
THANX FOR THE INFORMATION.

REGARDS,

RAYMOND J. RYERSON



AS BUILD – IMP. DISPL. BETWEEN TRANSFORMER AND CT



AS MODIFIED – IMP. DISPL. BETWEEN SENSOR AND C OF MODULE

BEARING MODULE
WIRING MODIFICATION
FIG. 1