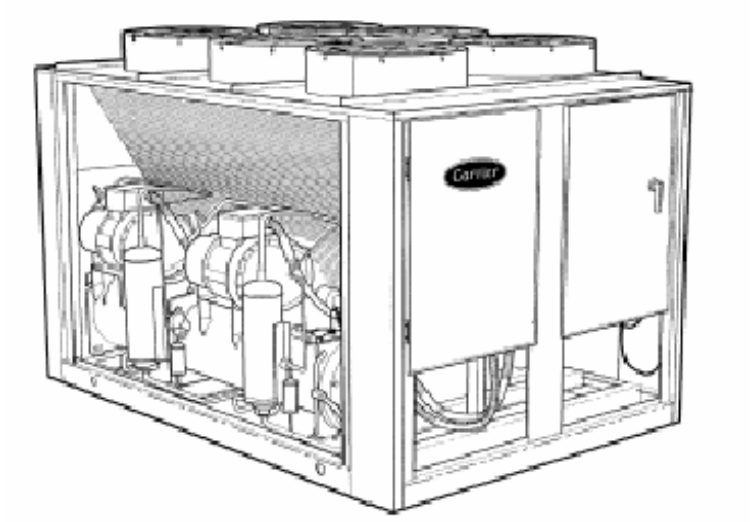
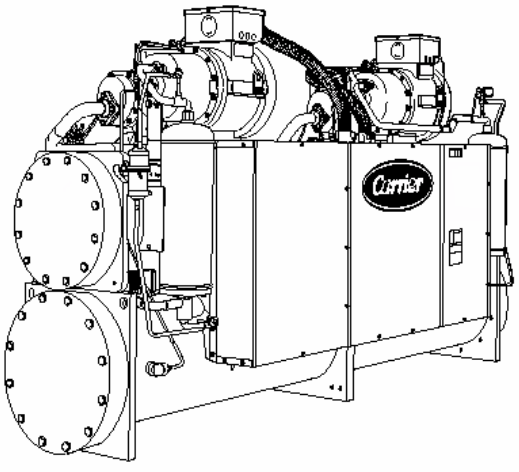
Global Chiller

Service Manual

30GX Series 0, 1, 2 and 3, Air-Cooled Chillers
30HXA Series 0 and 3, Condenserless Chillers
30HXC Series 0 and 3, Water-Cooled Chillers





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SAFETY CONSIDERATIONS

Installing, starting up, and servicing this equipment can be hazardous due to system pressures, electrical components, and equipment location (roof, elevated structures, etc.). Only trained, qualified installers and service mechanics should install, start-up, and service this equipment.

When working on this equipment, observe precautions in the literature, and on tags, stickers, and labels attached to the equipment and any other safety precautions that apply. Follow all safety codes. Wear safety glasses and work gloves. Use car in handling, rigging, and setting this equipment, an in handling all electrical components.

WARNING
Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation and service. There may be more that one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is complete.

WARNING
This unit uses a microprocessor-based electronic control system. Do not use jumpers or other tools to short out components or to bypass or otherwise depart from recommended procedures. Any short-to-ground of the control board or accompanying wiring may destroy the electronic modules or electrical components.

WARNING
To prevent potential damage to heat exchanger tubes always run fluid through heat exchangers when adding or removing refrigerant charge. Use appropriate brine solutions in cooler and condenser fluid loops to prevent the freezing of heat exchangers when the equipment is exposed to temperatures below 32 °F (0 °C). DO NOT VENT refrigerant valves within a building. Outlet from relief valves must be vented outdoors in accordance with the latest edition of ANSI/ASHRAE (American National Standards Institute/American Society of Heating, Refrigeration and Air Conditioning Engineers) 15 (Safety Code for Mechanical Refrigeration). The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation. Provide adequate ventilation in enclosed or low overhead areas. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness or death. Misuse can be fatal. Vapor is heavier than air and reduces the amount of oxygen available for breathing. Product causes eye and skin irritation. Decomposition products are hazardous.

WARNING

DO NOT attempt to unbraze factory joints when servicing this equipment. Compressor oil is flammable and there is no way to detect how much oil may be in any of the refrigerant lines. Cut lines with a tubing cutter as required when performing service. Use a pan to catch any oil that may come out of the lines and as a gage for how much oil to add to the system. DO NOT re-use compressor oil. DO NOT leave refrigerant system open to air any longer than necessary. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be completed.

INTRODUCTION

This information should be used with the Installation Instructions, and the Controls, Start-Up, Operation, Service and Troubleshooting book for these machines. Follow all safety precautions and procedures.

The Global Screw Chillers were produced in McMinnville, TN with serial numbers starting with 1896F through 3300F.

30GX Series 0 units were produced from ??97F until ???9?F. This release introduced the 50 Hz machines only.
30GX Series 1 units were produced from ??9?F until. ???9?F. This release introduced the 60 Hz machines.
30GX Series 2 units were produced from ???9?F until 0799F. This release introduced several manufacturing changes, including a plug to attach the liquid level sensor to the controls.
30GX Series 3 units were produced from 0899F until 3300F. This modification included the Texas Instruments Compressor Protection Module and the Mag-drive Oil Pump.

30HXA/HXC Series 0 units were produced from 1896F through 1199F.
30HXA/HXC Series 3 units were produced from 1299F through 3300F. This modification included the Texas Instruments Compressor Protection Module and the Mag-drive Oil Pump.

APPLICATION

Cooler Freeze Protection

Freeze protection is available through the use of the low ambient protection option. Since power is sometimes lost for extended periods during winter storms (particularly in suburban and rural areas) freeze protection will only be effective if back-up power supply can be assured for the unit's control circuit, heater and cooler pump. If not protected with an antifreeze solution, draining cooler and outdoor piping is recommended if system will not be used during freezing weather conditions.

There are two conditions that must be taken into account when determining the antifreeze concentration, leaving water set point and ambient freeze conditions. The

higher concentration must be used to adequately protect the machine. The use of automotive antifreezes is not recommended because of the fouling that can occur once their relatively short-lived inhibitors break down. Use only antifreeze solutions approved for heat exchanger duty.

Medium Temperature Brine Applications, 15 to 39.9 ºF (-9.4 to 4.4 ºC)
For applications where the leaving water temperature set point is less than 40 ºF (4.4 ºC), a suitable inhibited antifreeze solution must be used. The solution concentration must be sufficient to protect the chilled water loop to a Freeze Protection (first crystals) concentration of at least 15 ºF (8.3 ºC) below the leaving water temperature set point.

Low Ambient Protection
If chiller refrigerant or fluid lines are in an area where ambient conditions fall below 32 ºF (0 ºC), it is required that an antifreeze solution be added to protect the unit and fluid piping to a temperature 15 ºF (8.3 ºC) below the lowest anticipated ambient temperature.

Select concentration based on either Burst or Freeze Protection as dictated by application. If the chiller does not operate during the winter, nor is a start-up expected, a Burst Protection concentration is recommended. This concentration may not be high enough to keep the fluid pumpable. This is typically a lower concentration that will provide better performance from the machine. If the chiller does operate during the winter, a Freeze Protection concentration is recommended. This concentration will be high enough to keep the fluid pumpable at low ambient conditions.

IMPORTANT: Adding antifreeze solution is the only certain means of protecting the unit from freeze-up if the cooler heater fails or electrical service is interrupted during low ambient temperatures.

Cooler Head Reversal
Machines are shipped from the factory with the cooler heads in a given configuration. The cooler heads can be swapped end to end with little work. The cooler tubes may need to be faced to obtain a proper seal at the cooler head division plate to tubesheet.

Hail Guard Accessory (30GX Only)

Service Bulletins pertaining to this condition:

- SMB980075 – 30GX Sound Reduction, Hail Guard, and Wind Baffle Hood Accessory Package
  This bulletin advised of a manufacturing error with the engagement holes of the panels.

Sound Reduction Options

Compressor Sound Hoods

30GX Units

Service Bulletins pertaining to this condition:

- SMB980075 – 30GX Sound Reduction, Hail Guard, and Wind Baffle Hood Accessory Package
  This bulletin advised of a manufacturing error with the engagement holes of the panels.

Compressor Sound Blankets

RCD Totaline offers Acoustic Blankets for compressors as a potential sound reduction option. The blankets are custom designed to fit exactly to the compressors. They are fastened with Velcro and ties.

Bulletins pertaining to this option:

- PMB02-067 – Acoustic Blankets 101 – for 30 Series Applications
  This bulletin listed technical data for the acoustic blankets.
- PMB02-114 - Acoustic Blankets 101 – Revised
  This bulletin listed technical data for the acoustic blankets.
- PMB04-151 – Acoustic Blankets – Return Policy Notification
  This bulletin describes the RCD Return Policy for sound blankets.

Remote Condenser Piping (30HXA Only)

There were several design changes to this machine changing how the remote condenser piping was accomplished.

Service Bulletins pertaining to this condition:

- SMB980076 – 30HXA Liquid Line Solenoid Valves
  This program revised the control scheme of the liquid line solenoid valves.

Wind Baffle Accessory (30GX Only)

Service Bulletins pertaining to this condition:

- SMB980075 – 30GX Sound Reduction, Hail Guard, and Wind Baffle Hood Accessory Package
  This bulletin advised of a manufacturing error with the engagement holes of the panels.

Vibration Isolation

30GX Vibration Isolation Pads
The 30GX Vibration Isolation Pads are made of a synthetic rubber based elastomer that is oil resistant. The pad has a Hardness, Durometer A of 45-60 per ASTM D676. The recommended loading of the vibration pad is 20-70 psi.

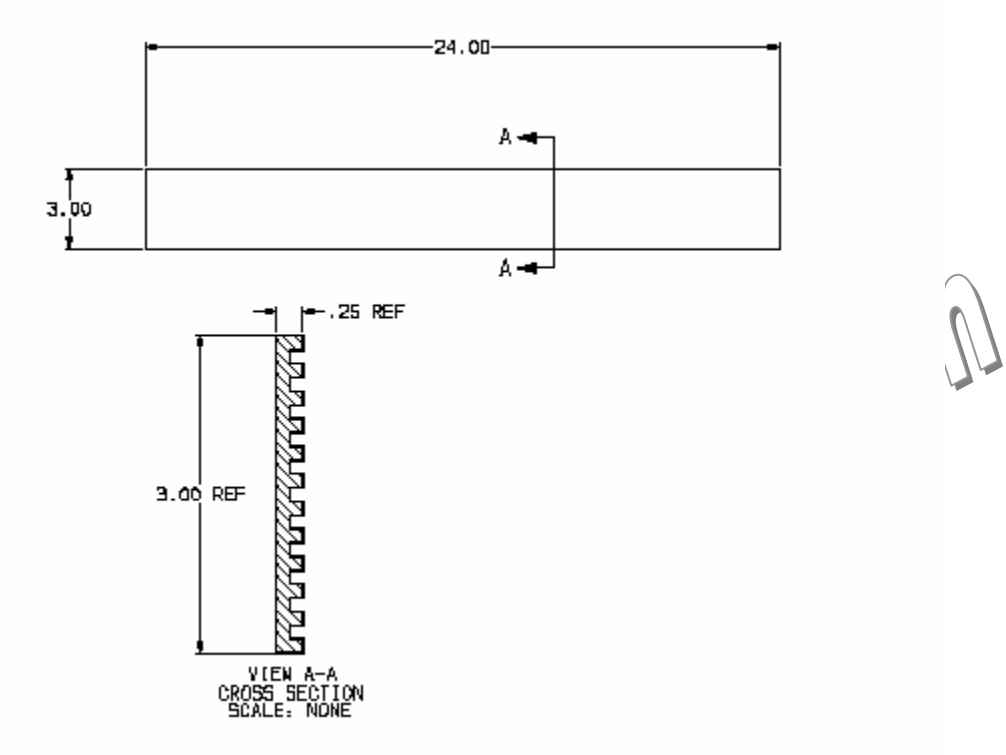

Table 1 - 30GX Vibration Isolation Pads

CONTROLS

Oil Heaters (30GX Only)
All 30GX machines are equipped with contact oil heaters on the oil separator. The control system operates the heaters in response to the saturated condensing temperature. The heater will be energized if the Saturated Condensing Temperature is less than 105 °F (40.6 °C). The heaters will be de-energized when the Saturated Condensing Temperature is above 110 °F (43.3 °C). If the oil level switch for a circuit is open, that circuit's heater will not be energized.

Password Protection
The password for the 30GX and 30HXA/HXC machines cannot be changed in the field. The default password is 1111. The password is required for changing configuration values.

Software

Version 17
Build Number 17.6
Serial Number start: Service Engineering Release

1. There was no provision for allowing loaders that were already on to stay on if there was a low DSH, low SST, etc. condition. Comfortlink addressed this, and we have changed the subroutine cap_ldr.c to be like that in Comfortlink. Also an error was corrected where we were trying to always load one circuit fully prior to adding any loaders to the other circuit. Comfortlink had already corrected this. Note that when only one circuit is running it will still allow that circuit to fully load prior to bringing on the other circuit, or if the other circuit has failed.

Version 17
Build Number 17.5
Serial Number start: Service Engineering Release

1. Corrected a problem with ver. 17.3 that prevented Ramp Loading from operating when enabled.

Version 17
Build Number 17.4
Serial Number start: Service Engineering Release

1. Corrected a problem with ver. 17.3 that would allow the compressor to load when CIR A LOW DISCHG SUPERHT or CIR B LOW DISCHG SUPERHT mode was in effect. Discharge superheat has to be greater than 15F before compressor is allowed to increase capacity.

Version 17
Build Number 17.3
Serial Number start: Service Release available through RCD

1. Corrected a problem with Version 17.2 that if the NO FLOW algorithm was DISABLED the machine would sometimes enter CIR A LOW DISCHG SUPERHT or CIR B LOW DISCHG SUPERHT mode and not allow the machine to load up. The capacity control algorithm would stop functioning preventing the machine from increasing or decreasing capacity.
2. Corrected a problem with Version 17.2 that if the Operating Mode PUMP ON DUE TO LOW SST mode was enabled it would remain enabled.

Version 17
Build Number 17.2
Serial Number start: Service Release available through RCD

1. Eliminated Heat Machine Support to get back code space. (Machines configured for Heat Machine cannot use this version software.)
2. Implemented the Fast Load Algorithm.
3. Implemented the No Flow algorithm, including a configuration decision to disable the algorithm if required. If SST is less than 0 °F (-18 °C) between 30 seconds and 90 seconds after compressor starts and SST continues to drop the compressor is turned off. Alarm 87(circuit A) or 88(circuit B) is generated. After 15 minutes the alarm is automatically reset and the circuit is allowed to start. If the alarm is generated a second time the circuit is disabled and must be manually reset.
4. Override 1 which opens EXV 20% when a circuit starts, now has a maximum time of 30 seconds after the circuit starts before it is engaged.
5. Condenser pump remains on for 30 seconds after the last compressor shuts off. (30HXC only)
6. The condenser water valve opens to 100% if either cooler or condenser freeze occurs. (30HXC only)
7. The condenser pump remains on if either cooler or condenser freeze occurs. (30HXC only)
8. The condenser pump comes on if either SCT is less than 34°F (1°C). (30HXC only)
9. Motor temperature setpoint now defaults to 170 °F (77 °C) for brine, 200 °F (93 °C) for water.
10. Motormaster has a low limit of 25% when other fan stages are on. This will prevent the motormaster fan(s) from spinning backwards when other fans are running.
11. Emergency Stop force is now cleared on a power cycle.
12. Compressor startup sequence modifications:
13. Delay compressor start for 10 seconds after oil solenoid is energized.
14. Oil pump remains on for two minutes after startup of the lead compressor.
15. Current imbalance (x.27) and voltage imbalance (x.57) alerts have been eliminated if the alarm is disabled.
16. Algorithm added to cycle the cooler water pump when the SST is low (brine freeze setpoint – 6°F), but the chilled water temperature is high. Previously, we were leaving the pump on, which was causing some jobs to experience very high water temperatures when the chiller was being started. If the machine is off and entering and leaving water temperatures are both greater than 65 °F for 5 continuous minutes, the pump will be shut off for 30 minutes. The pump will then be re-energized after the 30 minute off time. The pumps must run for at least 5 minutes and until the entering and leaving water temperatures are both greater than 65 °F. The 30 minute OFF, 5 minute ON cycle will be repeated during this mode. Mode PUMP ON DUE TO LOW SST is activated when this condition occurs. Mode is terminated at brine freeze + 10F.

17. If the rate of change of SCTA or SCTB is less than –2 °F/min. and SST < (brine freeze setpoint – 6 °F) the chilled water pump output is turned on. The pump stays on for 5 min. after both SCTA and SCTB rate of change is greater than or equal to -2 °F/min.
18. A configuration decision was added to disable the liquid level sensor. EXV is controlled by discharge superheat when disabled. No alarm is generated for the level sensors when their use is disabled.
19. The low limit for the motor cooling setpoint changed from 0 °F (-18 °C) to 120 °F (49 °C).
20. The minimum load valve will open as soon as either lead compressor starts. This will help with no refrigerant flow situations.
21. Addressed a problem where the oil pump remained on after the compressor was stopped.
22. The oil solenoid failure at startup threshold is now a delta oil pressure of 5 PSI instead of 3 PSI.
23. Ignore oil level switch for 10 seconds after lead compressor starts.
24. Text “A1 Oil Filter Pressure” changed to “A1 Oil Filter PD” (Same for A2, B1, B2).
25. Change the default configuration for the Alarm Reset by local/remote switch to disabled.
26. Increased delay on oil filter pressure drop alert from 1 minute to 5 minutes to eliminate nuisance alerts. (Added ver. 17.2)
27. Modified the staging logic so that when the lag circuit starts, the loader will not be added until after the no flow algorithm has timed out (90 seconds after compressor start). This adds about 30 seconds to the staging time. (Added ver. 17.2)
28. Changed the Motormaster fan logic. Previously when a fan stage cycled off, the Motormaster output went to 0%, then would not be able to catch the condensing temperature until the fan stage was brought on again. The change made is to set the Motormaster output to 100% when the fan stage fan shuts off. Additionally for common fans with Motormaster, the circuit that is not controlling the fan speed - set the fan speed integrator term of the PID equal to the integrator value for the circuit that is controlling the fan speed. This allows for a smooth transition if the non-controlling circuit sees an increase in SCT that is not seen on the other circuit. (Added ver. 17.2)

Version 16
Build Number 16.3
Serial Number start: Service Engineering Release

1. On 3 compressor units, when circuit A starts, always start the A1 compressor first. No changes to 2 or 4 compressor units. This overrides all other determination of which compressor starts first.
2. Fixed the lead-lag (Master-Slave) change over problem.
3. For the low discharge superheat alarms, instead of delaying 30 minutes at startup before starting to look at the alarm condition, delays 3 minutes instead.

4. Added Alarm 83,84,85,86 (A1/A2/B1/B2 Oil Filter Pressure Drop Too High) Alarm checking enabled only if the compressor is running. This alarm is generated if oil filter pressure drop exceeds 25 psig for 30HXC or 30 psig for 30GX and HXA. Alarm is manual reset but does not shut down compressor.
5. Cooler pump remains on for 30 seconds after the last compressor in the unit stops.
6. Condenser pump remains on for 30 seconds after the last compressor in the unit stops.
7. HSIO display of the OILPRESS table (Displayed OILPRESS table <12 STAT>). Created OILPRESS maintenance table. Available via CCN.
8. Made Cooler Freeze Protection a function of brine freeze point. If either cooler entering (COOL_EWT) or cooler leaving temperature (COOL_LWT) is less than (BRN_FRZ + 2) then the cooler freeze alarm is tripped.
9. Allow user to change the head pressure setpoint on 30GX080-150, 160 units. (Previous versions did not allow the user to raise the head pressure setpoint with the HSIO when the common fan configuration is selected.)
10. Added logic so that if Mode 22 is active, loaders on circuit A are prevented from being turned on. Likewise if Mode 23 is active, loaders on circuit B are prevented from being turned on.
11. Added logic so that if Mode 22 or Mode 23 is active, then close control is enabled.
12. Modified Water Valve logic so that the control output is 70% when a compressor starts instead of 100%. In determining which saturated condensing temperature to use for water valve control, use the highest of the two circuit's condensing temperature, UNLESS both are less than 105°F (40°C), then use the lowest of the two circuits are condensing temperature.

Version 15
Build Number 15.1
Serial Number start: 1200F

1. Corrected the inability to reset a Low Saturated Suction alarm after the 1 hour prohibition timer had expired.
2. Corrected the Proof of Flow Timing with Cooler Pump Control. When cooler pump control was enabled, it required a power cycle to initiate properly.

Version 14
Build Number 14.0
Serial Number start: 0400F

1. Modified Economizer Transducer Failure Alarm (Alarm 30 & 31) to add the following logic:
   - If economizer pressure is less than suction pressure minus 12 psig (34 kPa) for 1 minute then generate this alarm. This alarm can be reset through HSIO or if economizer pressure becomes greater than suction pressure plus 5 psig

(34 kPa). This corrected nuisance alarms that were being generated during the unit off mode.

Version 13
Build Number 13.3
Serial Number start: 0200F

Many of Version 13 changes where done to reduce the amount of time the unit operates in a Low Saturated Suction Temperature condition to reduce the opportunity to freeze tubes.

1. Oil solenoid output communication modified to send 'ON' command multiple times. This was done in case the command was lost due to noise.
2. Low Saturated Suction Temperature Alarm (Alarm 37 & 38) reset changed from manual to manual after 60 minutes. This means the alarm cannot be reset manually until a 60-minute timer has counted down.
3. Modified Economizer Transducer Failure Alarm (Alarm 30 & 31) to add the following logic:
   - If economizer pressure is less than suction pressure minus 5 psig (34 kPa) then generate this alarm. This alarm can be reset through HSIO or if economizer pressure becomes greater than suction pressure plus 5 psig (34 kPa).
4. Revised Cooler Pump Control logic to energize pump output anytime SST is less than Brine Freeze Point even if Cooler Pump Control is not enabled. This was done to allow chilled water pump control override for additional freeze protection.
5. Modified Cooler Pump Interlock Alarm (Alarm 53) to allow 90 seconds to close instead of 60. This alarm is generated during periods of transition from unit on mode to unit off mode. The change in timing was done to allow chilled water isolation valves more time to open.
6. Corrected cooler pump cycling and cooler heater cycling problem.
7. Revised Low SST unloading logic to unload compressor after 60 seconds instead of 90 seconds. This was done to reduce time unit runs with Low SST.
8. Modified MOP set point adjustment to clamp low end of set point from 32 °F (0 °C) to 34 °F (1 °C). MOP set point can be adjusted lower by high SCT conditions or low oil pressure conditions.
9. Revised EXV logic at start to open EXV when SST is less than LWT minus 4 °F (2 °C) instead of LWT minus 5 °F (3 °C).
10. Corrected downloading problem where downloading program would be interrupted after program was mostly downloaded.
11. Revised EXV logic during periods of low discharge superheat to control to Low SST plus 4 °F (2 °C) instead of Low SST plus 2 °F (1 °C).
12. Added logic to eliminate phantom alarm problem where alarms where generated on two-compressor units for a 3rd (A2) compressor.

Version 12
Build Number 12.0
Serial Number start: 3999F

1. Cooler Pump Interlock configuration always enabled.
2. Corrected FSM interface problem, which occurs when a circuit has alarmed.
   - FSM would not start second unit because it thought chiller had additional capacity to add.
3. Changed Cooler Pump Control to turn cooler pump 'ON' when SST is less than Brine Freeze Point and turn the pump 'OFF' when SST is greater than Brine Freeze Point plus 10 °F (6 °C).
4. Revised capacity control routine to prevent routine from running while compressors are in transition from starting condition to desired 2/3 loaded condition. This would impact units with more than two compressors. This was done to prevent routine from adding more stages before compressor had loaded to 2/3-load condition.
5. Installed a 15 °F (8 °C) offset for all fan stages when Motormaster is used. Previous version had offset on first stage of fan control only. This prevents two stages from turning on within 5 seconds of each other once SCT is greater than Head Pressure Setpoint plus 15 °F (8 °C).
6. The following changes where done to reduce nuisance trips on Low SST
   - Revised EXV logic when capacity is reduced because of Low SST condition. EXV does not close 150 steps when compressor is unloaded during Low SST capacity reduction.
   - Revised EXV algorithm to control to Low SST plus 2 °F (1 °C) instead of Low SST during periods of low discharge superheat.
   - Revised EXV algorithm to open 100 steps every 5 seconds when SST is less than Brine Freeze Point minus 26 °F (14 °C) versus the old logic which was SST is less than Brine Freeze Point minus 38 °F (21 °C).
   - Revised EXV logic to close EXV 20 steps instead of 50 steps during periods of Low Discharge Superheat.

Version 11
Not released into production.

Version 10
Build Number 10.1
Serial Number start: 30GX: 0899F, 30HX: 1299F

1. Oil pump operation modified to operate during low oil pressure conditions.
2. Corrected Brine Freeze Point metric conversion.
3. Corrected capacity control routine to use Brine Freeze point instead of 28 °F (-2.2 °C) for units with water. This corrected the problem where units would not fully load because of low Saturated Suction Temperature condition but had a brine freeze point of less than 34 °F (1.1 °C).
4. Revised EXV throttling while the machine is in a low oil pressure condition.
   - If oil pressure is less than low oil pressure set point then EXV will close 20 steps.
   - If oil pressure is greater than oil set point plus 2 psig (14 kPa) then valve will close 5 steps.
   - If oil pressure is greater oil set point plus 4 psig (28 kPa) valve will not open.

Version 9
Build Number 8.6
Serial Number start: 3498F

1. Modified EXV logic to give Low Saturated Suction Temperature Override a higher priority than Low Discharge Superheat. This reduces the occurrence of Low Saturated Suction Temperature Alarms.
2. Open EXV faster when in Low Saturated Suction Temperature condition. This reduces the occurrence of Low Saturated Suction Temperature Alarms.
3. Revised oil pressure trip point at start-up from a 30-second ramp to a 2-minute ramp to reduce the number of nuisance Low Oil Pressure Alarms.
4. Modified Motormaster logic to add additional fan stages faster to reduce nuisance High Pressure Switch trips.
5. Revised Low Discharge superheat override from unit based to circuit based. This allows the unaffected circuit to operate when the low discharge superheat protection algorithm is in effect on the opposite circuit.

Version 8
Build Number 8.0

1. Added series water flow Dual Chiller control.

Version 7
Build Number 7.9
Serial Number start: 4497F

1. Fixed the return to normal message with wrong time stamp.
2. Return to normal message removed from Alarm History tables to leave more room for actual alarm messages.
3. Remove condition that a circuit has to have more than 1 compressor ‘ON’ in order for the low suction pressure override to take effect.
4. Revised EXV logic to reduce low saturated suction temperature alarms.
5. Change the timing of the loader to go to the final state from 15 or 30 seconds to 1.5 minutes when second compressor starts on a circuit.

Version 6
Build Number 7.7

1. Fixed the return to normal date information if the alarm already returned to normal during manual reset.

Version 5
Build Number 7.6

1. Revised Alarm 54 (Cooler Pump Interlock Opened Unexpectedly) so that it will check for the condition all the time not just when the unit is in the allowed to run state. Cooler pump remains 'ON' for Alarm 53 or 54.
2. Modified Low Oil Level Alarm (Alarm 71 & 72) to reset automatically 3 times a day. Circuit shutdown occurs after 4th alarm in 24 hours.

Version 4
Build Number 7.5

1. One time input of compressor run time/starts for replacement PSIO.
   - Able to maintain run time and starts history after PSIO replacement.
2. Modified the logic as to which compressor is selected to stage down.
   - Previous logic selected the lag circuit and if two compressors are on selected the compressor with the highest wear factor.
   - New logic selects the lead circuit and if two compressors are on selects the compressor with the lowest wear factor.
3. Removed Alarms 19 & 20 on 30GX and modified oil heater logic to turn 'ON' oil heater when DGT is less than 105 °F (58 °C) and turn 'OFF' oil heater when DGT is greater than 110 °F (61 °C).
   - 30GX Medium Temperature Brine units failed to start because of this.
4. Modified motor cooling solenoid to be off on startup.
5. Modified low saturated suction logic for brine duty.
6. Modified EXV logic so that when a circuit starts the EXV will not move until SST is less than LWT minus 10 °F (6 °C).

Service Bulletins pertaining to this issue:

- SMB000026 – 30GX/HX Software Revisions
  This bulletin described the software revisions from Version 4 to Version 15. A more complete listing of PSIO1 modules was listed in this bulletin.

Operating Modes

Mode 26 – Pump On Due to Low SST
This operational mode was added in Version 17.2 software. The control algorithm was added to cycle the cooler water pump to limit the water temperatures when the Saturated Suction Temperature is at or below Brine Freeze Setpoint – 6°F, but when the chilled water temperature is high. If the machine is OFF and the entering and leaving water temperatures are both greater than 65 °F and the pump has been ON for at least 5 minutes, the pump will be shut off for 30 minutes. After 30 minutes, the pump will be energized until the water temperatures are both greater than 65 °F for 5 minutes. The 30 minute OFF, 5 minute ON cycle will be repeated during this mode. The Operating Mode "PUMP ON DUE TO LOW SST" is activated and displayed when this condition is active. Mode is terminated when the Saturated Suction Temperature reaches Brine Freeze Setpoint + 10 ºF.

In Version 17.2 once this mode was activated, it would not clear. Version 17.3 corrected this problem.

LITERATURE

Below is a list of literature for the ComfortLink Screw Compressor machines. Shaded literature is obsolete literature.

Form Number	Catalog Number	Title	Print Date	Reprint Date	Superceded By
Product Data					
30GX-1APD	523-028	30GX079-160 Ecologic Air-Cooled Chillers, 50/60 Hz	9/94		30GX-2APD
30GX-2APD	523-044	30GX080-175 Ecologic Air-Cooled Chillers, 50/60 Hz	5/96		30GX-3APD
30GX-3APD	523-031	30GX080-176 Ecologic Air-Cooled Chillers, 50/60 Hz	1/97		30GX-1PD
30GX-1PD	523-051	30GX080-176 Ecologic Air-Cooled Chillers, 50/60 Hz	7/97		30GX-2PD
30GX-2PD	523-053	30GX080-265 Ecologic Air-Cooled Chillers, 50/60 Hz	2/98		30GX-3PD
30GX-3PD	523-053	30GX080-350 Ecologic Air-Cooled Chillers, 50/60 Hz	7/99		
30HX-1APD					30HX-2APD
30HX-2APD	523-030	30HX076-271 Fluid-Cooled and Condenserless Chillers, 50/60 Hz	12/95		30HX-1PD
30HX-1PD	523-045	30HX076-186 Fluid-Cooled and Condenserless Chillers, 50/60 Hz	9/96		30HX-2PD
30HX-2PD	523-050	30HXA076-186, 30HXC076-271 Condenserless and Fluid-Cooled Chillers, 50/60 Hz	3/97		30HX-3PD
30HX-3PD	523-052	30HXA076-186, 30HXC076-271 Condenserless and Fluid-Cooled Chillers, 50/60 Hz	12/97		30HX-4PD
30HX-4PD	523-054	30HXA076-271, 30HXC076-271 Condenserless and Fluid-Cooled Chillers, 50/60 Hz	3/99		
Product Bulletin					
111-00-08		Coming – Improved 30HX with ComfortLink Controls			
111-00-03E		Coming – Improved 30HX with ComfortLink Controls			
111-00-59		New 30GXN,R ComfortLink Chiller Phase In/Phase Out	07/07/00		
111-00-60		Taking Orders: 30HXA & C with ComfortLink	07/14/00		
Promotional Information					
	830-072	30HX Chlorine-free, Water-Cooled Ecologic Screw Chillers	0295		
Submittal Bulletin					
30GX-1SB					30GX-2SB
30GX-2SB	513-445	30GX080-175 Air-Cooled Liquid Chiller	4/96		30GX-3SB
30GX-3SB					30GX-4SB
30GX-4SB	513-450	30GX080-265 Air-Cooled Liquid Chiller	12/97		30GX-5SB
30GX-5SB	513-457	30GX080-265 Air-Cooled Liquid Chiller	5/98		30GX-6SB

Form Number	Catalog Number	Title	Print Date	Reprint Date	Superceded By
30GX-6SB	513-462	30GX080-350 Air-Cooled Liquid Chiller	8/99		
30HXA-1SB					
30HXA-2SB					30HXA-3SB
30HXA-3SB	513-458	30HXA076-271 Condenserless Liquid Chiller	1/99		
30HXC-1SB					
30HXC-2SB					
30HXC-3SB					30HXC-5SB
30HXC-4SB					30HXC-5SB
30HXC-5SB	513-459	30HXC076-271 Water-Cooled Liquid Chiller	1/99		
Installation Instructions					
30GX-1SI	563-045	30GX080-175 Ecologic Air-cooled Chillers, 50/60 Hz	10/96		30GX-8SI
30GX-8SI	533-010	30GX080-176 Ecologic Air-cooled Chillers, 50/60 Hz	1/97		30GX-13SI
30GX-13SI	533-055	30GX080-265 Ecologic Air-cooled Chillers, 50/60 Hz	2/98		30GX-15SI
30GX-15SI	533-035	30GX080-350 Ecologic Air-cooled Chillers, 50/60 Hz	8/99		
30HX-1SI	563-052	30HXA,HXC076-186 Water-Cooled and Condenserless Chillers, 50/60 Hz	5/96		30HX-4SI
30HX-4SI	533-013	30HXA076-186, 30HXC076-271 Ecologic Fluid-Cooled and Condenserless Chillers, 50/60 Hz	7/97		30HX-7SI
30HX-7SI	533-004	30HXA,HXC076-271 Ecologic Fluid-Cooled and Condenserless Chillers, 50/60 Hz	5/99		
Controls, Start-Up, Operation, Service and Troubleshooting					
30G,H-1T	563-059	30GX080-175, 30HXA,HXC076-186 Ecologic Air-Cooled Fluid Cooled Chillers, 50/60 Hz	8/96		30G,H-2T
30G,H-2T		30GX080-176, 30HXA,HXC076-271 Ecologic Air-Cooled Fluid Cooled Chillers, 50/60 Hz	3/97		30G,H-3T
30G,H-3T	533-062	30GX080-265, 30HXA,HXC076-271 Ecologic Air-Cooled Fluid Cooled Chillers, 50/60 Hz	1/98		
30G,H-4T	533-092	30GX080-265, 30HXA,HXC076-271 Ecologic Air-Cooled Fluid Cooled Chillers, 50/60 Hz	3/99		30G,H-5T
30G,H-5T	533-095	30GX080-350, 30HXA,HXC076-271 Ecologic Air-Cooled Fluid Cooled Chillers, 50/60 Hz	8/99		
Accessory Installation Instructions					
30/48/50-1SI	563-064	30GX080-350, 30HX076-271, 48/50 EJ,EK,EW,EY024-068 Remote Enhanced Display Accessory (LID-2B), 50/60 Hz	4/99		30/48/50-3SI
30/48/50-3SI	563-028	30GX080-350, 30HX076-271, 48/50 EJ,EK,EW,EY024-068 Remote Enhanced Display Accessory, 50/60 Hz	4/00		30/48/50-4SI
30/48/50-4SI	533-00028	ComfortLink Series Units and 30GX080-350, 30HX076-271, 48/50 EJ,EK,EW,EY024-068 Remote Enhanced Display Accessory, 50/60 Hz	6/01		

Form Number	Catalog Number	Title	Print Date	Reprint Date	Superceded By
30G-25SI	563-064	30GN,GT,GU040-420, 30GTR,GUN,GUR040-420, 30GTN015-420, 30GXN,R080-528, 30GX080-350 Accessory Unit Control Display Access Door	7/00		30G,R-2SI
30G,R-2SI	533-00030	30GN,GT,GU040-420, 30GTR,GUN,GUR040-420, 30GTN015-420, 30RA010-055, 30GXN,R080-528, 30GX080-350 Accessory Unit Control Display Access Door	7/01	1/02	
30GX-3SI					30GX-11SI
30GX-5SI	563-049	30GX080-265 Accessory Sound Reduction/Hail Guard/Wind Baffle Hoods	3/98		30GX-16SI
30GX-6SI	563-050	30GX080-176 Accessory Low Ambient Operation, MotorMaster III Control, 50/60 Hz	2/97		30GX-12SI
30GX-7SI	563-051	30GX080-175 Accessory Grille Package, 50/60 Hz	9/96		30GX-9SI
30GX-9SI	533-021	30GX080-176 Accessory Grille Package, 50/60 Hz	3/97		30GX-14SI
30GX-10SI	533-033	30GX080-265 Accessory Head Mounted Cooler Heater, 50/60 Hz	6/98		30GX-17SI
30GX-11SI	533-048	30GX080-265 Vibration Isolation Accessory Kit	12/97		30GX-18SI
30GX-12SI	533-052	30GX080-176 Accessory Low Ambient Operation, MotorMaster III Control, 50/60 Hz	3/98		30GX-19SI
30GX-14SI	533-061	30GX080-265 Accessory Security Grille Package, 50/60 Hz	1/98		30GX-20SI
30GX-16SI	533-049	30GX080-350 Accessory Sound Reduction/Hail Guard/Wind Baffle Hoods	7/99		
30GX-17SI	533-057	30GX080-350 Accessory Head Mounted Cooler Heater, 50/60 Hz	4/00		
30GX-18SI	533-058	30GX080-350 Vibration Isolation Accessory Kit	7/99		
30GX-19SI	533-059	30GX080-350 Accessory Low Ambient Operation, MotorMaster III Control, 50/60 Hz	8/99		
30GX-20SI	533-065	30GX080-265 Accessory Security Grille Package, 50/60 Hz	8/99		
30GX-22SI	533-00004	30GX080-350, 30GXN,R080-450 Accessory Sound Reduction/Hail Guard/Wind Baffle Hoods	7/00		30GX-28SI
30GX-24SI	533-00006	30GXN,R080-528, 30GX080-350 Vibration Isolation Accessory Kit	7/00	1/02	
30GX-26SI	533-00008	30GXN,R080-528, 30GX080-350 Accessory Security Grille Package 50/60 Hz	7/00	2/02	
30GX-28SI	533-00033	30GX080-350, 30GXN,R080-528 Accessory Sound Reduction/Hail Guard/Wind Baffle Hoods	6/01	2/02	
30GX,HX-1SI	563-055	30GX080-175, 30HX076-186 Victaulic Connection Accessory	7/96		30GX,HX-6SI
30GX,HX-2SI	563-056	30GX080-176, 30HX076-271 Minimum Load Control Accessory, 50/60 Hz	1/97		30GX,HX-7SI
30GX,HX-3SI	563-057	30GX080-176, 30HX076-186 Control Transformer Accessory	10/96		
30GX,HX-4SI	563-058	30GX080-420, 30HX076-271 Remote Enhanced Display Accessory, 50/60 Hz	12/96		30/48/50-1SI 30/48/50-3SI

Form Number	Catalog Number	Title	Print Date	Reprint Date	Superceded By
30GX,HX-5SI					30GX,HX-9SI
30GX,HX-6SI	533-028	30GX080-350, 30HX076-186 Victaulic Connection Accessory Kit	5/99		30GX,HX-13SI
30GX,HX-7SI	533-063	30GX080-350, 30HX076-271 Minimum Load Control Accessory, 50/60 Hz	6/99		
30GX,HX-9SI	533-069	30GX080-265, 30HX076-271 Control Transformer Accessory	1/98		30GX,HX-11SI
30GX,HX-11SI	533-074	30GX080-350, 30HX076-271 Control Transformer Accessory	10/99		
30GX,HX-12SI	533-039	30GX080-350, 30HX076-271 Insulation Package	7/99		
30GX,HX-13SI	563-088	30GX080-350, 30HX076-186 Victaulic Connection Accessory Kit	11/99		
30GX,HX-16SI	533-00011	30GX080-350, 30GXN,R080-450, 30HX076-271 Accessory Insulation Package	7/00		30GX,HX-19SI
30HX-2SI	563-053	30HX076-186 Vibration Isolation Accessory Kit	7/96		30HX-5SI
30HX-3SI	563-054	30HXA,HXC076-271 Accessory Sound Reduction Enclosure	10/96		
30HX-5SI	533-023	30HX076-271 Vibration Isolation Accessory Kit	10/99		
30HX-9SI	533-019	30HXA,HXC076-271 Accessory Sound Reduction Enclosure	6/00		
Wiring Diagrams					
30GX-1W	563-061	30GX Air Cooled Chillers, 50/60 Hz	12/97		
30GX-2W	533-084	30GX Air Cooled Chillers, 50/60 Hz	4/99		
30HX-1W	563-062	30HXA, 30HXC Condenserless and Fluid Cooled Chillers, 50/60 Hz	8/97		
30HX-2W	563-043	30HXA, 30HXC Condenserless and Fluid Cooled Chillers, 50/60 Hz	4/00		

SERVICE

Alarm and Alert Codes

The following alerts x.1 to x.10 are Compressor Protection Module alerts. The “x” will be replaced with the number of the compressor that is in the alert condition. Compressor A1 is indicated by “1”. Compressor A2 is indicated by “2”. Compressor B1 is indicated by “5”. Compressor B2 is indicated by “6”. For example, if Compressor A1’s high pressure switch opens, the control will indicate Alert 1.1.

x.1 – High Pressure Switch Trip Alert
Action taken by control: Compressor is shut down
Reset Method: Manual (CPM and PSIO)

This alarm is generated when the High Pressure Switch for the compressor opens.

HN67LM100 Compressor Protection Module
If this condition is encountered, check the following items:

- Find the cause of high pressure switch trip. For 30GX machines, check the condenser fan operation. Software versions prior to 15, Motormaster control

algorithms did not stage fans properly. For 30HXA machines, check the condenser fan relays and condenser for proper operation. For 30HXC machines, check the operation of the Condenser Water Regulating Valve. Check strainers to insure proper water flow.
- For air systems check the coils for debris or air recirculation.
- Confirm that the machine charge is correct.
- Check for proper connection of the High Pressure Switch to the CPM.
- Confirm the proper value for the Maximum Condensing Temperature Set Point, [1][SRVC].
- Check for non-condensables in the circuit.

Service Bulletins pertaining to this condition:
- SMB980008 – 30GX/HX Software Upgrade
  This program upgraded the unit software to version 7.0.
- SMB000022 – 30GX/HX Upgrade Program
  This program upgraded the unit software to version 15.0.

HN67LM101 and 30GX503191 Compressor Protection Module
The Compressor Protection Module will signal this alarm if the High Pressure Switch is open for at least 250-500 milliseconds.

If this condition is encountered, check the following items:
- Find the cause of high pressure switch trip. For 30GX machines, check the condenser fan operation. Software versions prior to 15, motormaster control algorithms did not stage fans properly. For 30HXA machines, check the condenser fan relays for proper operation. Check to be sure that the correct Fan Cycling Pressure Switches are used. For 30HXC machines, check the operation of the Condenser Water Regulating Valve. Check strainers to insure proper water flow.
- For air systems check the coils for debris or air recirculation.
- Confirm that the machine charge is correct.
- Check to be sure that the High Pressure Switch connections to the CPM are made with trifurcated terminals. Production machines with trifurcated terminals began 3199F.
- Confirm the proper value for the Maximum Condensing Temperature Set Point, [1][SRVC].
- Check for non-condensables in the circuit.

Service Bulletins pertaining to this condition:
- SMB000022 – 30GX/HX Upgrade Program
  This program upgraded the unit software to version 15.0. Additionally, this program upgraded the High Pressure Switch connections to trifurcated terminals.

x.2 – No Motor Current Detected Alert
Action taken by control: Compressor is shut down
Reset Method: Manual (CPM and PSIO)

This alarm will be generated if no motor current is detected while the compressor status is “On”.

HN67LM100 Compressor Protection Module

If this condition is encountered, check the following items:

- Early machines had an external compressor overload. Check to see if it has tripped. If it has, determine the cause of the trip. Check the setting of the overload.
- Check the operation of the contactors. If the contactors do not pull in, the alarm can be generated.
- Check the toroid wiring harness connections for good connections.
- Check the toroids. The measured resistance should be 0.6 Ω. Check the Molex connector from the CPM to the compressor contactors for proper connection.
- Early production machines with EPROMs prior to B3309 were subject to transition faults. The transition time was reduced to 5 seconds with the B3309 EPROM.
- On Wye-Delta starters, be sure the shorting bars on the S contactor are installed.

Service Bulletins pertaining to this condition:

- SMB980004 – Compressor Protection Module Software Upgrade
  This program upgraded the CPM software to B3309.

HN67LM101 and 30GX503191 Compressor Protection Module

If this condition is encountered, check the following items:

- Check the operation of the contactors. If the contactors do not pull in, the alarm can be generated. Check the Molex connectors from the CPM to the compressor contactors.
- Check the Molex connectors from the toroids to the CPM. Loose connections can cause this alarm. Some modules have had conformal coating on the CPM pin connections interfering with the harness connection. Early versions of the toroid module were found with poor solder connections at the printed circuit board.
- Check the toroid harness connections for the trifurcated terminals. Trifurcated terminals were used starting 1899F. A connection problem at the CPM or toroid could cause the alarm.
- Check the solder joint of the toroid connector pins. Check for cold solder joint problem at the toroid Molex connector. Loose connections will result in this alarm.
- Check the toroid resistance. The measured resistance should be 64.3-70.4 Ω (30GX502786) or 38.5-42 Ω (30GX504711).
- Check for a chattering High Pressure Switch. The High Pressure Switch is in series with the control relays of the CPM board. If the High Pressure Switch opens momentarily, for less than 250-500 milliseconds, the control relay will open, causing the compressor contactors to open. The CPM will detect a no motor current condition and signal that alarm. This is true for all revisions up to and including Rev. 30D.
- On Wye-Delta starters, be sure the shorting bars on the S contactor are installed.

Service Bulletins pertaining to this condition:

- SMB000022 – 30GX/HX Upgrade Program
  This program upgraded the CPM to toroid harness and CPM to High Pressure Switch connections to trifurcated terminals.

x.25 – Current Imbalance >10% Alert
Action taken by control: Circuit is shut down
Reset Method: Manual (CPM and PSIO)

If the CPM detects a current imbalance greater than 10% for more than 25 minutes, the alarm is generated. The current is monitored by three (3) separate toroids for the HN67LM100 module. For the Texas Instrument module, there is a single molded piece that houses the three (3) toroids. A common leg connects all three sensors.

If after checking the items below, this alarm can be disabled, under [3][SRVC]. This will raise the trip point, and if that level is reached the machine will alarm on x.3. If the alarm is disabled and at any time the current imbalance reaches the 10% level, alarm x.27 will be displayed.

If this condition is encountered, check the following items:

HN67LM100 Compressor Protection Module

- Check the voltage for imbalance. Voltage imbalance has a strong relation to the current imbalance.
- Check the toroids. The measured resistance should be 0.6 Ω. Check the toroid wiring. Do not allow the wires to run in parallel with high voltage sources, greater than 30 volts.
- Check all wiring connections at the compressor, contactors, and terminal block. Loose connections can cause current imbalances.
- Dry run the contactors to see that they are pulling in correctly. Inspect the contactor pads for arcing or corrosion. While these machines were not produced with these contactors if replacement Telemecanique contactors with the date codes 2T01181 (2T is the manufacturing point, 01 is the year, 18 is the week, 1 is the day of the week) through 2T0146x were used, they may have a binding spring in the contactor actuator that can cause the contactor not to function properly. Contactors with date codes as early as 2T0025 have also been reported with this problem.
- Check for power devices attached downstream of the toroid other than the compressor.

Service Bulletins pertaining to this condition:

- SMB980004 – Compressor Protection Module Software Upgrade
  This program upgraded the CPM software to B3309.
- SMB020027 – 30GX,HX Compressor Contactor Failures
  This bulletin described the failure mode of the Telemecanique contactors with the binding actuator.

- SMB020027A – 30GX,HX Compressor Contactor Failures
  This bulletin superseded SMB020027. There was no change to the body of the document. The revision clarified the warranty claim procedures.

HN67LM101 and 30GX503191 Compressor Protection Module

- Check the voltage imbalance. Voltage imbalance has a strong relation to the current imbalance.
- Check the toroids. The measured resistance should be 64.3-70.4 Ω (30GX502786) or 38.5-42 Ω (30GX504711). Check the toroid wiring. Do not allow the wires to run in parallel with high voltage sources, greater than 30 volts.
- Check all wiring connections at the compressor, contactors, and terminal block. Loose connections can cause current imbalances.
- Dry run the contactors to see that they are pulling in correctly. Inspect the contactor pads for arcing or corrosion. While these machines were not produced with these contactors if replacement Telemecanique contactors with the date codes 2T01181 (2T is the manufacturing point, 01 is the year, 18 is the week, 1 is the day of the week) through 2T0146x were used, they may have a binding spring in the contactor actuator that can cause the contactor not to function properly. Contactors with date codes as early as 2T0025 have also been reported with this problem.
- Check for power devices attached downstream of the toroid other than the compressor.
- If the CPM is 30GX503191, consider changing the CPM and toriod to HN67LM103 and 30GX504711. This will allow the compressor power wiring to both pass through the toriod rather than one over and one through. Caution must be exercised to be sure that the wiring for the compressor is not switched causing it to rotate backwards. A reverse rotation safety switch, HK01CB002 is strongly recommended if compressor wiring is changed.
- For units with compressors with MTA greater than 314 that use the ½ current CCP, HN67LM104, converting to the 30GX504711 current transformer module with the full current CCP, HN67LM103 can correct many nuisance alarms. This change was made in production starting with serial numbers 2301F (30GX), and 1002Q (30HXA/HXC).

Service Bulletins pertaining to this condition:

- SMB000022 – 30GX/HX Upgrade Program
  This program upgraded the CPM to toroid harness' connections to trifurcated terminals.
- SMB020027 – 30GX,HX Compressor Contactor Failures
  This bulletin described the failure mode of the Telemecanique contactors with the binding actuator.
- SMB020027A – 30GX,HX Compressor Contactor Failures
  This bulletin superseded SMB020027. There was no change to the body of the document. The revision clarified the warranty claim procedures.
- SMB020039 – 30GX/HX Ground Fault and Current Imbalance Alarms

This bulletin described the changes required to update the ½ current Compressor Protection Modules to the full current modules and new ½ current toriods.

x.27 – Current Imbalance >10% Alert (Warning)
Action taken by control: None
Reset Method:

This is not a true alarm, as the control does not shut down the circuit. This alarm will be displayed if the Current Imbalance Alarm has been disabled, and the current imbalance is greater than 10%.

Version 17.0 software removed this alarm from the alarm structure.

x.3 – Current Imbalance >18% Alert (HN67LM100)
x.3 – Current Imbalance >25% Alert (HN67LM100, HN67LM101, 30GX503191)
Action taken by control: Circuit is shut down
Reset Method: (CPM and PSIO)

This alarm will be generated if the Current Imbalance Alarm has been disabled under [3][SRVC] and the current imbalance reaches the 18 or 25% threshold for more than 25 minutes, depending upon which device is used. The early HN67LM100 modules, EPROMs B3309 and earlier are programmed with the upper limit of the current imbalance at 18%. The HN67LM100 modules with the B3544, B3549, and B3550 EPROMs and the HN67LM101 and 30GX503191 CPMs are programmed with the upper limit of the current imbalance at 25%.

If this condition is encountered, refer to the x.25 alarm items to check.

x.35 – Single Phase Current Loss Alert
Action taken by control: Circuit is shut down
Reset Method: Manual (CPM and PSIO)

This alarm will be generated when the current imbalance reaches a programmed level. That level has changed through the life of the product and is covered in more detail according to the device used.

<u>HN67LM100 Compressor Protection Module</u>
If the current imbalance between phases is greater than 20% for EPROMs B3309 and earlier, or 30% for EPROMs B3544, and B3550, the alarm will be generated.

If this condition is encountered, check the following items:
- Check the voltage imbalance. Voltage imbalance has a strong relation to the current imbalance.

- Check the toroids. The measured resistance should be 0.6 Ω. Check the toroid wiring. Do not allow the wires to run in parallel with high voltage sources, greater than 30 volts.
- Check all wiring connections at the compressor, contactors, and terminal block. Loose connections can cause current imbalances.
- Dry run the contactors to see that they are pulling in correctly. Inspect the contactor pads for arcing or corrosion. While these machines were not produced with these contactors if replacement Telemecanique contactors with the date codes 2T01181 (2T is the manufacturing point, 01 is the year, 18 is the week, 1 is the day of the week) through 2T0146x were used, they may have a binding spring in the contactor actuator that can cause the contactor not to function properly. Contactors with date codes as early as 2T0025 have also been reported with this problem.
- Check for sources of electrical noise, such as VFDs. These devices can change the electrical phase characteristics of the incoming power enough to "fool" the phase sensing ability of the CPM.
- Check for power factor correction capacitors. These devices must be installed for the compressor only, not the whole machine. At part load conditions with capacitors applied for the whole machine rather than each compressor, the power phasing can be changed by over correcting the power supply. This can "fool" the phase sensing ability of the CPM.
- Check to be sure that the CPM EPROM has been upgraded to B3309 chip.

If nothing can be found and the chip is B3309 or earlier, the single phase current limit can be increased by obtaining B3544. This chip is used in the RCD replacement CPMs, HN67LM100. If the problem continues with the B3544 EPROM, another EPROM B3549 can be used. This is available through RCD under the part number 30GX660015. This EPROM has the single phase current loss alarm removed.

Service Bulletins pertaining to this condition:

- SMB020027 – 30GX,HX Compressor Contactor Failures
  This bulletin described the failure mode of the Telemecanique contactors with the binding actuator.
- SMB020027A – 30GX,HX Compressor Contactor Failures
  This bulletin superseded SMB020027. There was no change to the body of the document. The revision clarified the warranty claim procedures.

<u>HN67LM101 and 30GX503191 Compressor Protection Module</u>

With the introduction of the HN67LM101 and 30GX503191 module, the criteria for the trip point changed. The alarm will be generated by one of two conditions. If the running current is less than 50% of MTA and a current imbalance between phases of greater than 50% is measured for 1 second, the alarm will be generated. If the running current is at or greater than 50% of MTA and a current imbalance between phases of 30% is measured for 1 second, the alarm will be generated.

- Check the voltage imbalance. Voltage imbalance has a strong relation to the current imbalance.
- Check the toroids. The measured resistance should be 64.3-70.4 Ω (30GX502786) or 38.5-42 Ω (30GX504711). Check the toroid wiring. Do not allow the wires to run in parallel with high voltage sources, greater than 30 volts.
- Check all wiring connections at the compressor, contactors, and terminal block. Loose connections can cause current imbalances.
- Dry run the contactors to see that they are pulling in correctly. Inspect the contactor pads for arcing or corrosion. . While these machines were not produced with these contactors if replacement Telemecanique contactors with the date codes 2T01181 (2T is the manufacturing point, 01 is the year, 18 is the week, 1 is the day of the week) through 2T0146x were used, they may have a binding spring in the contactor actuator that can cause the contactor not to function properly. Contactors with date codes as early as 2T0025 have also been reported with this problem.

Service Bulletins pertaining to this condition:

- SMB000022 – 30GX/HX Upgrade Program
  This program upgraded the CPM to toroid harness' connections to trifurcated terminals.
- SMB020027 – 30GX,HX Compressor Contactor Failures
  This bulletin described the failure mode of the Telemecanique contactors with the binding actuator.
- SMB020027A – 30GX,HX Compressor Contactor Failures
  This bulletin superseded SMB020027. There was no change to the body of the document. The revision clarified the warranty claim procedures.

x.4 – High Motor Current Detected Alert

Action taken by control: Compressor is shut down
Reset Method: Manual (CPM and PSIO)

This alarm will be generated if the motor current detected by the toroids exceeds the Must Trip Amp (MTA) setting.

<u>HN67LM100 Compressor Protection Module</u>

If this condition is encountered, check the following items:

- Check to be sure that the EPROM has been upgraded to at least B3309. Versions prior to this EPROM had a Wye-Delta transition time of 8 seconds. This resulted in the compressor motor slowing down during the transition causing the motor to start in an across-the-line configuration.
- Check for compressor operation outside of the operational envelope. Check to be sure the compressor is starting unloaded.
- Check the Must Trip Amp Configuration Header for the proper setting.
- Check all power connections for tightness from the terminal block to the contactors and compressor terminals.

- Check the toroid harness to be sure that the harness does not run in parallel with voltage sources greater than 30 vac. This can induce a voltage on a leg of the harness.
- Check for a bad compressor motor.
- Check for moisture in the refrigerant circuit.
- Check for power devices attached downstream of the toroid other than the compressor.

Service Bulletins pertaining to this condition:
- SMB980004 – Compressor Protection Module Software Upgrade
  This program upgraded the CPM software to B3309.

HN67LM101 and 30GX503191 Compressor Protection Module
If this condition is encountered, check the following items:
- Check for compressor operation outside of the operational envelope. Check to be sure the compressor is starting unloaded.
- Check all power connections for tightness from the terminal block to the contactors and compressor terminals.
- Check the Must Trip Amp Configuration Header for the proper setting.
- Check the toroid harness to be sure that the harness does not run in parallel with voltage sources greater than 30 vac. This can induce a voltage on a leg of the harness.
- On the ½ current modules, check the power wiring to the toroid. Be sure that only one set of leads goes through the toroid, if configured.
- CPM Revision 26 software had a problem with moisture trapped under the conformal coating. This could be the cause of the alarm.
- Check to be sure that the contactors in a Wye-Delta configuration are properly operating. A delay in the transition can cause the machine to trip on locked rotor current as the compressor starts in an Across-the-Line configuration.
- Check for a bad compressor motor.
- Check for moisture in the refrigerant circuit.
- Check for power devices attached downstream of the toroid other than the compressor.

Service Bulletins pertaining to this condition:
- SMB000022 – 30GX/HX Upgrade Program
  This program included the upgrade of the module to at least Rev. 29A software.

x.5 – Compressor Ground Fault Alert
Action taken by control: Compressor is shut down.
Reset Method: Manual (CPM and PSIO)

HN67LM100 Compressor Protection Module

On HN67LM100 CPMs a Ground Fault alarm will be generated by a current to ground of 2.5 +/- 2.0 amps as measured through the toroids. Beginning with B3309 software, the trip limit was raised to 4.5 +/- 2.0 amps and the trip time was increased to 1 minute.

Current-to-ground is sensed by instantaneously summing each of the three phases together based on the current detected by the toriod for each phase. Current greater than the limits listed above, is assumed to be current-to-ground.

If this condition is encountered, check the following items:

- Check all connections from the terminal block to the compressor contactor, from the compressor contactor to the compressor. All connections should be tight. Inspect the connections for signs of overheating.
- Check for a grounded compressor motor.
- CPM EPROM software before B3309 ground fault timing was less than 1 minute. Update the software to B3544.
- Check the contactors for arc marks on the contactor pads.
- Check the toroid wiring to be sure that the harness does not run in parallel with voltage sources greater than 30 vac. This can induce a voltage on a leg of the harness.
- Check the Molex connectors from the toroids to the CPM. Loose connections can cause this alarm. Early versions of the toroid module were found with poor solder connections at the printed circuit board.
- Check the solder joint of the toroid connector pins. Check for cold solder joint problem at the toroid Molex connector. Loose connections will result in this alarm.
- Check the toroid resistance. The resistance for each toroid should be 0.6 Ω.
- Check for power devices attached downstream of the toroid other than the compressor.

Service Bulletins pertaining to this condition:

- SMB980004 – Compressor Protection Module Software Upgrade
  This program upgraded the CPM software to B3309.

HN67LM101 and 30GX503191 Compressor Protection Module

On the full current modules, a Ground Fault alarm will be generated by a current to ground of 2.5 +/- 2.0 amps as measured through the toroid.

On the ½ current modules 30GX503191, a Ground Fault alarm will be generated by a current to ground of 7.5 +/- 2.0 amps as measured through the toroid.

With both modules the full and half current modules, current-to-ground is sensed by instantaneously summing each of the three phases together based on the current detected by the toriod for each phase. Current greater than the limits listed above, is assumed to be current-to-ground.

If this condition is encountered, check the following items:

- If either compressor MTA is greater than 314 amps, be sure that the CPM is a ½ current module (30GX503191).
- Check all connections from the terminal block to the compressor contactor, from the compressor contactor to the compressor. All connections should be tight. Inspect the connections for signs of overheating.
- Check for a grounded compressor motor.
- CPM Revision 26 software had a problem with moisture trapped under the conformal coating. This could result in a x.5 alarm.
- Check the contactors for arc marks on the contactor pads.
- Check the toroid harness connections for the trifurcated terminals. Trifurcated terminals were used starting 1899F. A connection problem at the CPM or toroid could cause the alarm.
- Be sure the toroid harness has a good connection at both the CPM and the toroid. Some modules have had conformal coating on the CPM pin connections interfering with the harness connection. Early versions of the toroid module were found with poor solder connections at the printed circuit board.
- Check the toroid harness to be sure that the harness does not run in parallel with voltage sources greater than 30 vac. This can induce a voltage on a leg of the harness.
- Check the solder joint of the toroid connector pins to be sure that they are securely fastened to the toroid circuit board. Loose connections will result in this alarm.
- Check the toroid resistance. The measured resistance should be 64.3-70.4 Ω (30GX502786) or 38.5-42 Ω (30GX504711).
- Check for power devices attached downstream of the toroid other than the compressor.

For ½ current modules, check the following additional items:

- Check for a voltage imbalance to the machine.
- Check to be sure that the parallel leads for each phase originate from the same terminal block stud.
- Check the current draw on all six conductors. Select the three conductors, one from each phase, that have the closest current draw. Route these leads through the toroid to sense the compressor current draw. ***CAUTION*** – Change only one phase at a time. Mixing the phases could result in the compressor running backwards resulting in a compressor failure. The control system will not detect this condition.
- For units with compressors with MTA greater than 314 that use the ½ current CCP, HN67LM104, converting to the 30GX504711 current transformer module with the full current CCP, HN67LM103 can correct many nuisance alarms. This change was made in production starting with serial numbers 2301F (30GX), and 1002Q (30HXA/HXC). With the use of the 30GX504711 current transformer module, the ground fault detection DIP Switch #2 should be enabled.

If no problems can be found, turning DIP Switch #2 on disables the Ground Fault detection algorithm of the module. In order for this change to be registered, the power

to the Compressor Protection Module must be cycled. Starting 4400F, all ½ current boards have ground fault disabled from the factory.

Service Bulletins pertaining to this condition:

- SMB000022 – 30GX/HX Upgrade Program
  This program included the upgrade of the module to at least Rev. 29A software and added trifurcated terminal harnesses from the CPM to the toroid.
- SMB020039 – 30GX/HX Ground Fault and Current Imbalance Alarms
  This bulletin described the changes required to update the ½ current Compressor Protection Modules to the full current modules and new ½ current toriods.

x.55 – Voltage Imbalance >3% Alert
Action taken by control: Circuit is shut down
Reset Method: Manual (CPM and PSIO)

This is a valid alarm for the HN67LM100 Compressor Protection Modules only. If the CPM detects a voltage imbalance greater than 3% for more than 25 minutes, the alarm is generated. Three (3) separate leads to the HN67LM100 module monitor the voltage.

If after checking the items below, this alarm can be disabled, under [3][SRVC]. This will raise the trip point to 7%, and if that level is reached the machine will alarm on x.6. If the alarm is disabled and at any time the voltage imbalance reaches the 3% level, alarm x.57 will be displayed.

If this condition is encountered, check the following items:

- Check the voltage imbalance.
- Check the voltage leads to the CPMs.
- Check all wiring connections at the compressor, contactors, and terminal block.

If no problem can be found, disable the voltage imbalance alarm under [3][SRVC].

x.57 – Voltage Imbalance >3% Alert (Warning)
Action taken by control: None
Reset Method:

This is not a true alarm, as the control does not shut down the circuit. This alarm will be displayed if the Voltage Imbalance Alarm has been disabled, and the voltage imbalance is greater than 3%.

x.6 – Voltage Imbalance >7% Alert
Action taken by control: Circuit is shut down
Reset Method: Manual (CPM and PSIO)

This alarm will be generated if the Voltage Imbalance Alarm has been disabled under [3][SRVC] and the voltage imbalance reaches the 7% threshold for more than 25 minutes.

If this condition is encountered, refer to the x.55 alarm items to check.

x.65 – Single Phase Voltage Loss Alert
Action taken by control: Circuit is shut down
Reset Method: Manual (CPM and PSIO)

This alarm is valid for HN67LM100 Compressor Protection Modules only. This alarm is generated if the CPM detects a greater than 20% voltage imbalance between phases.

If the condition is encountered, check the following items:
- Check the voltage imbalance.
- Check the voltage leads to the CPMs.
- Check all wiring connections at the compressor, contactors, and terminal block.

If the condition cannot be corrected, check to be sure that the EPROM chip is B3309. If the problem still cannot be resolved, change the EPROM to B3549 (30GX660015). If this change is made, be sure to install a Reverse Rotation Pressure Switch. This will serve as a safety and protect the compressor from a reverse rotation condition.

x.7 – Voltage Phase Reversal Alert
Action taken by control: Compressor is shut down
Reset Method: Manual (CPM and PSIO)

<u>HN67LM100 Compressor Protection Module</u>
This alarm is valid for HN67LM100 Compressor Protection Modules only. If the CPM detects a voltage phase reversal, the alarm is generated. Voltage is monitored by three connections on the Compressor Protection Module. This is one of the primary means to detect a reverse rotation condition.

If this condition is encountered, check the following items:
- If the compressor has not been operational, reverse two of the incoming power leads. Do not change the internal wiring from the terminal block to the compressor contactors and compressors. Changing these wires defeats the control systems protection.
- Check to be sure that the voltage taps are correctly connected from the source to the Compressor Protection Module.
- In some process applications, primarily in use with SCRs, the Compressor Protection Module can read erratic voltage readings. If this is encountered, consider replacing the Compressor Protection Module EPROM to B3550, (30GX660016). A

reverse rotation switch must be installed on the Compressor Protection Module's compressor.

x.75 – Contactor Failure Alert

Action taken by control: Compressor is unloaded, further loading of the machine is prohibited. The oil solenoid is opened for the compressor.
Reset Method: Manual (CPM and PSIO)

If the CPM detects a compressor current greater than 10% of Must Trip Amps (MTA), the alarm is generated. The affected compressor is unloaded, and the further loading of the machine is prohibited. All support functions, oil solenoid, oil pump, EXV, cooler and condenser pumps are supported during this alarm. If the compressor is not operating, it is not uncommon for the machine to alarm on a High Saturated Suction Temperature Alarm.

If this condition is encountered, check the following items:

- Check the compressor contactors to be sure that the contacts are not welded.
- Check for a wiring problem that is applying power to the compressor contactors, other than from the Compressor Protection Module.
- Check the toroid harness to be sure that the harness does not run in parallel with voltage sources greater than 30 vac. This can induce a voltage on a leg of the harness.
- Check for power devices attached downstream of the toroid other than the compressor.

<u>HN67LM100 Compressor Protection Module</u>
Additional items to consider:

- If no cause for the alarm can be found, consider changing the EPROM to B4057 (AH4004). The EPROM is available from RCD. This EPROM software has the X.75 alarm removed.

<u>HN67LM101 and 30GX503191 Compressor Protection Module</u>
Additional items to consider:

- CPM Revision 26 software had a problem with moisture trapped under the conformal coating. This condition could trigger this alarm.

Service Bulletins pertaining to this condition:

- SMB000022 – 30GX/HX Upgrade Program
  This program included the upgrade of the Compressor Protection Module to at least Revision 29A software.

x.8 – Current Phase Reversal Alert

Action taken by control: Compressor is shut down.
Reset Method: Manual (CPM and PSIO)

The Compressor Protection Module detecting a current phase reversal of the incoming power supply through the toroids triggers the alarm.

HN67LM100 Compressor Protection Module
With the HN67LM100 module, Current Phase Reversal is one of the two methods used to prevent the compressor from reverse rotation.

If this condition is encountered, check the following items:
- If the compressor has not been operational, reverse two of the incoming power leads. Do not change the internal wiring from the terminal block to the compressor contactors and compressors. Changing these wires defeats the control systems protection.
- Be sure the toroid harness has a good connection at both the CPM and the toroid.
  - Check to be sure that all of the toroids are installed in the same orientation. This can be checked at the Molex connector on the top of the toroid.

In some cases with machines installed in industrial applications, enough electrical noise can be generated on the incoming power supply to cause this alarm. Changing the EPROM to B3549 (30GX660015) has corrected the problem. If this change is made, be sure to install a Reverse Rotation Pressure Switch. This will serve as a safety and protect the compressor from a reverse rotation condition.

HN67LM101 and 30GX503191 Compressor Protection Module
This algorithm is the primary means to detect a reverse rotation condition. CPMs with software revisions prior to Revision 30D can also trigger this alarm if the High Pressure Switch is open when the compressor is commanded on. If the main power to the compressor contactors is absent at start-up, this alarm will also be generated, since phase rotation can not be sensed.

If this condition is encountered, check the following items:
- If the compressor has not been operational, reverse two of the incoming power leads. Do not change the internal wiring from the terminal block to the compressor contactors and compressors. Changing these wires defeats the control systems protection.
- If the CPM module software is prior to Revision 30D, check the High Pressure Switch. If the switch is open, mechanically or electrically at start-up, the module will signal this alarm.
- Check to be sure that the High Pressure Switch connections to the CPM are made with trifurcated terminals. Production machines with trifurcated terminals began 3199F.
- Be sure power is available to the compressor contactors. Check the fuses or circuit breakers supplying the machine.
  - Check the toroid harness connections for the trifurcated terminals. Trifurcated terminals were used starting 1899F. A connection problem at the CPM or toroid could cause the alarm.

- Be sure the toroid harness has a good connection at both the CPM and the toroid. Some modules have had conformal coating on the CPM pin connections interfering with the harness connection.
- Check the toroid harness to be sure that the harness does not run in parallel with voltage sources greater than 30 vac. This can induce a voltage on a leg of the harness.
- Check the solder joint of the toroid connector pins to be sure that they are securely fastened to the toroid circuit board. Loose connections will result in this alarm.
- Check to be sure that all of the toroids within the block are installed in the same orientation.
- CPM Revision 26 software had a problem with moisture trapped under the conformal coating. This condition could trigger this alarm.

Service Bulletins pertaining to this condition:

- SMB000022 – 30GX/HX Upgrade Program
  This program included the upgrade of the Compressor Protection Module to at least Revision 29A software and added trifurcated terminal harnesses from the CPM to the toroid and trifurcated terminals to the High Pressure Switch.

x.85 – Motor Over Temperature Alert
Action taken by control: Compressor is shut down
Reset Method: Manual (CPM and PSIO)

The motor temperature limit is 240 °F (116 °C). If this temperature is sensed by the motor thermistor, the alarm will be generated.

If this condition is encountered, check the following items:

- Check for a thermistor failure.
- Check for a thermistor wiring error.
- Check the motor cooling solenoid for proper operation.
- Check the circuit for proper refrigerant charge.
- Check the motor cooling line for any restrictions
- Check the economizer inlet screen to be sure that it is free of debris.
- Check the liquid line strainer for restrictions. 30GX080-176 machines have cleanable strainers starting with serial number 0899F. 30HXA076-271 and 30HXC076-186 have cleanable strainers starting with serial number 1299F. 30HXA076-146 and 30HXC076-146 use a smaller strainer than the other machines. This has been known to restrict the flow over time at the outlet. There is very little flow over the outside surface of the basket. To resolve this, a dimple was added to the basket assembly.
- On 2-compressor circuits, check to be sure that the economizer solenoid valve is functioning properly.

Service Bulletins pertaining to this condition:

- SMB990030 – 30GX/HX Refrigerant Strainers
  This bulletin superceded by SMB000015.
- SMB990072A – 06N Motor Temperature Operating Limits
  This bulletin described the operating limits for the compressor and the actions taken by the control system at various points.
- SMB000015 – 30GX/HX Refrigerant Strainers
  This bulletin superceded SMB990030 and addressed the addition of the cleanable strainers.
- SMB010012 – 30HXA/HXC076-146 Liquid Line Strainer Change
  This bulletin advised of the new strainer assembly for the 30HXA/HXC076-146 machines.

x.9 – Open Thermistor Alert
Action taken by control: Compressor is shut down.
Reset Method: Manual (CPM and PSIO)

The alarm is generated if the Compressor Protection Module detects an open circuit for the motor winding thermistor.

If this condition is encountered, check the following items:
- Check for a bad motor thermistor.
- Check for a loose connection in the motor winding thermistor circuit.

Each compressor is equipped with 2 motor winding thermistors. Before using the back-up thermistor, verify that there is not a wiring error.

x.95 – Configuration Header Fault Alert
Action taken by control: Compressor will not be allowed to start
Reset Method: Manual (CPM and PSIO)

This alarm is generated when the CPM detects an erroneous setting of the Must Trip Amps (MTA) Configuration Header, with either all jumpers open or closed. To reset this alarm, the power must be removed from the CCP for a minimum of 5 seconds. The alarm reset button will not clear this alarm.

If this condition is encountered, check the following items:
- Check to be sure that the configuration header is firmly seated in the holder.
- Check to be sure that the configuration header is properly punched.

x.10 – Shorted Thermistor Alert
Action taken by control: Compressor is shut down.
Reset Method: Manual (CPM and PSIO)

The alarm is generated if the Compressor Protection Module detects a shorted circuit for the motor winding thermistor.

If this condition is encountered, check the following items:
- Check for a bad motor thermistor.
- Check for a grounded connection in the motor thermistor circuit.

Each compressor is equipped with 2 motor winding thermistors. Before using the back-up thermistor, verify that there is not a wiring error.

7 – Circuit A Discharge Gas Thermistor Failure Alert
8 – Circuit B Discharge Gas Thermistor Failure Alert
Action taken by control: Circuit is shut down.
Reset Method: Manual (PSIO)

This alarm will be generated if the thermistor is read by the control outside of the –40 to 245 °F (-40 to 118 °C) range. Since the discharge gas temperature tracks the oil temperature, if the Discharge Gas Temperature exceeds 210 °F (99 °C) the alarm will also be generated.

If this condition is encountered, check the following items:
- Check for a thermistor failure.
- Check for a thermistor wiring error.
- Check for a faulty oil heater relay.
- Check the circuit's refrigerant charge. Low charge can cause higher than normal discharge temperatures.
- Check the compressor's internal pressure relief to be sure that it is closed.
- Check the compressor rotors. Damage to the compressor rotors can cause an internal bypass, elevating the discharge temperature.

Service Bulletins pertaining to this condition:
- SMB990029 – Thermistor Improvements
  This bulletin described the changes made to the design of the thermistor to improve its reliability.

9 – Cooler Leaving Water Thermistor Failure Alarm
Action taken by control: Machine is shut down.
Reset Method: Automatic

This alarm will be generated if the thermistor is read by the control outside of the –40 to 245 °F (-40 to 118 °C) range.

If this condition is encountered, check the following items:
- Check for a thermistor failure.

- Check for a thermistor wiring error.

Service Bulletins pertaining to this condition:
- SMB990029 – Thermistor Improvements
  This bulletin described the changes made to the design of the thermistor to improve its reliability.

10 – Cooler Entering Water Thermistor Failure Alert
Action taken by control: Machine continues to operate
Reset Method: Automatic

This alarm will be generated if the thermistor is read by the control outside of the –40 to 245 °F (-40 to 118 °C) range. The machine will continue to operate, with a fixed rise/ton of 0.1 °F/% Total Capacity (0.06 °C/% Total Capacity).

If this condition is encountered, check the following items:
- Check for a thermistor failure.
- Check for a thermistor wiring error.

Service Bulletins pertaining to this condition:
- SMB990029 – Thermistor Improvements
  This bulletin described the changes made to the design of the thermistor to improve its reliability.

11 – Condenser Leaving Water Thermistor Failure Alert
12 – Condenser Entering Water Thermistor Failure Alert
Action taken by control: Machine continues to operate
Reset Method: Automatic

This alarm will be generated if the thermistor is read by the control outside of the –40 to 245 °F (-40 to 118 °C) range. The machine will continue to operate.

If this condition is encountered, check the following items:
- Check for a thermistor failure.
- Check for a thermistor wiring error.

Service Bulletins pertaining to this condition:
- SMB990029 – Thermistor Improvements
  This bulletin described the changes made to the design of the thermistor to improve its reliability.

13 – Compressor A1 High Motor Temperature Alert
14 – Compressor A2 High Motor Temperature Alert
15 – Compressor B1 High Motor Temperature Alert
16 – Compressor B2 High Motor Temperature Alert
Action taken by control: Affected compressor is shut down
Reset Method: Manual (PSIO)

This alarm will be generated if the thermistor is read by the control outside of the –40 to 245 °F (-40 to 118 °C) range, for 5 consecutive readings.

If this condition is encountered, check the following items:
- Check for a thermistor failure.
- Check for a thermistor wiring error.
- Check the motor cooling solenoid for proper operation.
- Check the circuit for proper refrigerant charge.
- Check the motor cooling line for any restrictions
- Check the economizer inlet screen to be sure that it is free of debris.
- On 2-compressor circuits, check to be sure that the economizer solenoid valve is functioning properly.

19 – Circuit A Low Oil Temperature at Start-Up Alert
20 - Circuit B Low Oil Temperature at Start-Up Alert
Action taken by control: Circuit not allowed to start (30GX only)
Reset Method: Automatic

This alarm is generated if the Discharge Gas Thermistor senses a temperature less than the Saturated Condensing Temperature + oil_rise. Oil rise was a variable set in [6][SRVC] from 0 to 40 °F (0 to 22 °C).

Version 4 software removed these two alarms, since the oil temperature tracks the discharge gas temperature.

If this condition is encountered, check the following items:
- Check the oil heater for proper operation.
- Check the Discharge Gas Thermistor for proper operation.
- Be sure that the software has been upgraded to at least Version 7.

Service Bulletins pertaining to this condition:
- SMB980008 – 30GX/HX Upgrade Program
  This program included the upgrade of all machines to Version 7 software. This version added logic to reduce the time that the machine was in a low saturated suction temperature condition.
- SMB000026 – 30GX/HX Software Revisions
  This bulletin addressed the numerous software changes that have occurred over the life of this software.

21 – External Reset Temperature Thermistor Failure Alert
Action taken by control: Machine continues to operate, reset disabled
Reset Method: Automatic

This alarm will be generated if the thermistor is read by the control outside of the –40 to 245 °F (-40 to 118 °C) range. The machine will continue to operate with reset disabled under normal control set points,

If this condition is encountered, check the following items:
- Check for a thermistor failure.
- Check for a thermistor wiring error.

Service Bulletins pertaining to this condition:
- SMB990029 – Thermistor Improvements
  This bulletin described the changes made to the design of the thermistor to improve its reliability.

22 – Circuit A Discharge Pressure Transducer Failure Alert
23 – Circuit B Discharge Pressure Transducer Failure Alert
24 – Circuit A Suction Pressure Transducer Failure Alert
25 – Circuit B Suction Pressure Transducer Failure Alert
Action taken by control: Affected circuit is shut down.
Reset Method: Automatic

This alarm will be generated if the transducer calibration offset is greater than 6 psig (41 kPa). Additionally, if the voltage ratio ($Voltage_{Measured}$ / $Voltage_{Reference}$) by the PSIO is greater than 99.9% or less than 0.5%.

If this condition is encountered, check the following items:
- Check for a faulty transducer.
- Check for a wiring error or problem between transducer and the PSIO.
- Check for a faulty power supply for the transducer.

26 – Compressor A1 Oil Pressure Transducer Failure Alert
27 – Compressor A2 Oil Pressure Transducer Failure Alert
28 – Compressor B1 Oil Pressure Transducer Failure Alert
29 – Compressor B2 Oil Pressure Transducer Failure Alert
Action taken by control: Affected compressor is shut down.
Reset Method: Automatic

This alarm will be generated if the transducer calibration offset is greater than 6 psig (41 kPa). Additionally, if the voltage ratio (Voltage $_{Measured}$ / Voltage $_{Reference}$) by the PSIO is greater than 99.9% or less than 0.5%.

If this condition is encountered, check the following items:
- Check for a faulty transducer.
- Check for a wiring error or problem between transducer and the PSIO.
- Check for a faulty power supply for the transducer.

30 – Circuit A Economizer Pressure Transducer Failure Alert
31 – Circuit B Economizer Pressure Transducer Failure Alert
Action taken by control: Affected circuit is shut down.
Reset Method: Automatic

This alarm will be generated if the transducer calibration offset is greater than 6 psig (41 kPa). Additionally, if the voltage ratio (Voltage $_{Measured}$ / Voltage $_{Reference}$) by the PSIO is greater than 99.9% or less than 0.5%.

With the introduction of Version 13 software, another criteria was added for this alert. If the Economizer Pressure is less than the Suction Pressure by 5 psig (34 kPa), the alarm will be tripped. This algorithm caused a number of nuisance alerts. It was revised in Version 14. The new logic generates the alarm if the Economizer Pressure is 12 psig (83 kPa) less than the Suction Pressure for 1 minute. The alarm will reset automatically if the economizer pressure is greater than the suction pressure by 5 psig (34 kPa).

If this condition is encountered, check the following items:
- Check for a faulty transducer.
- Check for a wiring error or problem between transducer and the PSIO.
- Check for a faulty power supply for the transducer.
- Check to be sure that the Suction Service Valve, if equipped is open.

Service Bulletins pertaining to this condition:
- SMB000022 – 30GX/HX Upgrade Program
  This program included the upgrade of the Compressor Protection Module to at least Revision 29A software and added trifurcated terminal harnesses from the CPM to the toroid and trifurcated terminals to the High Pressure Switch.
- SMB000026 – 30GX/HX Software Revisions
  This bulletin addressed the numerous software changes that have occurred over the life of this software.

32 - Transducer Supply 4.5 to 5.5 Volts Alarm
Action taken by control: Machine is shut down
Reset Method: Manual (PSIO)

This alarm is generated if the PSIO measures a voltage at PSIO1-J7-34 and PSIO1-J7-35 of less than 4.5 vdc or greater than 5.5 vdc.

If this condition is encountered, check the following items:
- Check the power supply PS1 for proper voltage.
- Check the transformer supplying PS1 for proper voltage.
- Check the reference voltage wiring for proper connections.
- Confirm the voltage through the HSIO, [7][STAT] 5 Volt Supply. If the measured voltage does no agree with the reported voltage, consider replacing PSIO1 due to a bad monitoring channel.

34 - 4-20 mA Reset Input Out of Range Alert
Action taken by control: Reset function disabled, machine continues to operate with normal set point.
Reset Method: Automatic

If this option is configured, and the input signal measured is less than 2 mA or greater than 22 ma. The original software was written with the upper limit at 20 mA. The signal connects to PSIO2-J7-19 and PSIO2-J7-20 for 30HX machines, or PSIO2-J7-22 and PSIO2-J7-23 for 30GX machines. Both of these channels are configured for an analog 0-10 vdc signal. In order to change this to a 4-20 mA input, a 500 Ω, ½ watt resistor must be installed across the connection points.

The 4-20 mA signal generator must be powered by a separate power supply.

Care should be taken when interfacing with other manufacturer's control systems, due to power supply differences, full wave bridge versus half wave rectification. The two different power supplies cannot be mixed. PIC modules utilize a full-wave bridge power supply. A signal isolation device should be utilized if a half wave rectification signal generator device is used.

If this condition is encountered, check the following items:
- Check the signal generator for proper output signal by measuring across the PSIO2 input terminals for a 2-10 vdc signal.
- Check to be sure that the signal leads are connected to the correct position on the PSIO2.
- Confirm the polarity of the signal connection.
- Check to be sure that the 500 Ω, ½ watt resistor is installed correctly.

35 - 4-20 mA Demand Limit Input Out of Range Alert
Action taken by control: Demand Limit function disabled, machine continues to operate with normal set point.
Reset Method: Automatic

If this option is configured, and the input signal measured is less than 2 mA or greater than 22 ma. The original software was written with the upper limit at 20 mA. The signal connects to PSIO2-J7-22 and PSIO2-J7-23 for 30HX machines, or PSIO2-J7-13 and PSIO2-J7-14 for 30GX machines. Both of these channels are configured for an analog 0-10 vdc signal. In order to change this to a 4-20 mA input, a 500 Ω, ½ watt resistor must be installed across the connection points.

The 4-20 mA signal generator must be powered by a separate power supply.

Care should be taken when interfacing with other manufacturer's control systems, due to power supply differences, full wave bridge versus half wave rectification. The two different power supplies cannot be mixed. PIC modules utilize a full-wave bridge power supply. A signal isolation device should be utilized if a half wave rectification signal generator device is used.

If this condition is encountered, check the following items:

- Check the signal generator for proper output signal by measuring across the PSIO2 input terminals for a 2-10 vdc signal.
- Check to be sure that the signal leads are connected to the correct position on the PSIO2.
- Confirm the polarity of the signal connection.
- Check to be sure that the 500 Ω, ½ watt resistor is installed correctly.

36 - Loss of Communication with *[Hardware Point]* Alarm

Action taken by control: Depends on which point, either the function will be disabled, the affected circuit or the machine will be shut down.

Reset Method: Automatic

This alarm will be generated if the PSIO1 looses communication with a hardware point. The hardware point will be displayed with the alarm code.

Hardware Point	Sensing or Controlling Module	Control Point Name	Action taken until communication is restored
ALARM	PSIO1	Alarm Relay	No Action
CFLOW_SW	DSIO-EXV	Cooler Flow Switch	Machine shut down
COND_ENT	PSIO2	Condenser Entering Water Thermistor	Alert 12
COND_LWT	PSIO2	Condenser Leaving Water Thermistor	Alert 11
COND_PMP	PSIO2	Condenser Pump Relay	Machine shut down
COOL_ENT	PSIO2	Cooler Entering Water Thermistor	Alert 10
COOL_LWT	PSIO2	Cooler Leaving Water	Alarm 9

Hardware Point	Sensing or Controlling Module	Control Point Name	Action taken until communication is restored
		Thermistor	
COOL_HTR	PSIO1	Cooler Heater	Cooler Pump Relay is commanded ON
COOL_PMP	PSIO1	Condenser Pump Relay	No Action
DFLOW_SW	PSIO2	Condenser Flow Switch	Machine shut down
DISTMP_A	PSIO2	Discharge Gas Thermistor (Oil Temperature) Circuit A	Circuit shut down
DISTMP_B	PSIO2	Discharge Gas Thermistor (Oil Temperature) Circuit B	Circuit shut down
DMD_SW1	PSIO2	Demand Limit Switch 1	No Action
DMD_SW2	PSIO2	Demand Limit Switch 2	No Action
DP_A	PSIO1	Discharge Pressure Circuit A	Circuit shut down
DP_B	PSIO1	Discharge Pressure Circuit B	Circuit shut down
DUAL	PSIO2	Dual Set Point Switch	Control to Set Point 1
ECN_PR_A	PSIO1	Economizer Pressure Circuit A	Circuit shut down
ECN_PR_B	PSIO1	Economizer Pressure Circuit B	Circuit shut down
EXVA	DSIO-EXV	Expansion Valve Circuit A	Circuit shut down
EXVB	DSIO-EXV	Expansion Valve Circuit B	Circuit shut down
FAN_1	CPMA1 † CPM1 ‡	Fan Relay 1	No Action
FAN_2	DSIO-HV	Fan Relay 2	No Action
FAN_3	DSIO-HV	Fan Relay 3	No Action
FAN_4	CPMB1 † CPM1 ‡	Fan Relay 4	No Action
FAN_5	DSIO-HV	Fan Relay 5	No Action
FAN_6	DSIO-HV	Fan Relay 6	No Action
HC_SW		Heat/Cool Switch	Machine shut down
HR_ENT		Heat Reclaim Entering Water Thermistor	No Action
HR_LWT		Heat Reclaim Leaving Water Thermistor	No Action
ICE_DONE	PSIO2	Ice Complete Indication	Disable function
ICE_VALV		Ice Valve	Disable function
K_A1_FBK	CPMA1 † CPM1 ‡	Compressor A1 Feedback	Compressor shut down
K_A1_RLY	CPMA1 † CPM1 ‡	Compressor A1 Relay	Compressor shut down
K_A2_FBK	CPMA2 † CPM2 ‡	Compressor A2 Feedback	Compressor shut down
K_A2_RLY	CPMA2 † CPM2 ‡	Compressor A2 Relay	Compressor shut down
K_B1_FBK	CPMB1 †	Compressor B1 Feedback	Compressor shut down

Hardware Point	Sensing or Controlling Module	Control Point Name	Action taken until communication is restored
	CPM1 ‡		
K_B1_RLY	CPMB1 † CPM1 ‡	Compressor B1 Relay	Compressor shut down
K_B2_FBK	CPM2 ‡	Compressor B2 Feedback	Compressor shut down
K_B2_RLY	CPM2 ‡	Compressor B2 Relay	Compressor shut down
LOADR_A1	PSIO1	Compressor Loader A1	No Action
LOADR_A2	PSIO1	Compressor Loader A2	No Action
LOADR_B1	PSIO1	Compressor Loader B1	No Action
LOADR_B2	PSIO1	Compressor Loader B2	No Action
LMT_MA	PSIO2	Demand Limit 4-20 mA Input	Disable function
LOR_SW	DSIO-EXV	Local/Off/Remote Switch	Machine shut down
MLV_A	PSIO2 * DSIO-HV §	Minimum Load Valve Relay Circuit A	Disable function
MLV_B	PSIO2 * DSIO-HV §	Minimum Load Valve Relay Circuit B	Disable function
MOTOR_A	PSIO2	Motormaster Output Circuit A	Disable function
MOTOR_B	PSIO2	Motormaster Output Circuit B	Disable function
MTRCL_A1	CPMA1 † CPM1 ‡	Compressor A1 Motor Cooling	Compressor shut down
MTRCL_A2	CPMA2 † CPM2 ‡	Compressor A2 Motor Cooling	Compressor shut down
MTRCL_B1	CPMB1 † CPM1 ‡	Compressor B1 Motor Cooling	Compressor shut down
MTRCL_B2	CPM2 ‡	Compressor B2 Motor Cooling	Compressor shut down
OAT	PSIO2	Outside Air Thermistor	Disable function
OIL_A1	PSIO1	Compressor A1 Oil Pressure Transducer	Compressor shut down
OIL_A2	PSIO1	Compressor A2 Oil Pressure Transducer	Compressor shut down
OIL_B1	PSIO1	Compressor B1 Oil Pressure Transducer	Compressor shut down
OIL_B2	PSIO1	Compressor B2 Oil Pressure Transducer	Compressor shut down
OILA_HTR	DSIO-HV	Oil Heater Circuit A	Disable function
OILA_SW	DSIO-EXV	Oil Level Switch Circuit A	Circuit shut down
OILB_HTR	DSIO-HV	Oil Heater Circuit B	Disable function
OILB_SW	DSIO-EXV	Oil Level Switch Circuit B	Circuit shut down
OILPMP_A	PSIO2	Oil Pump Circuit A	No action
OILPMP_B	PSIO2	Oil Pump Circuit B	No action
OILSL_A1	CPM1 ‡	Oil Solenoid Compressor A1	Compressor shut down
OILSL_A2	CPM2 ‡	Oil Solenoid Compressor A2	Compressor shut down
OILSL_B1	CPM1 ‡	Oil Solenoid Compressor B1	Compressor shut down

Hardware Point	Sensing or Controlling Module	Control Point Name	Action taken until communication is restored
OILSL_B2	CPM2 ‡	Oil Solenoid Compressor B2	Compressor shut down
OILSOL_A	CPMA1 †	Oil Solenoid Circuit A	Circuit shut down
OILSOL_B	CPMB1 †	Oil Solenoid Circuit B	Circuit shut down
P_REF	PSIO1	5 volt Transducer Reference	Machine shut down
RALARMx	PSIO1 * PSIO2 §	Remote Alarm Relay x (1-16)	Disable function
RST_MA	PSIO2	Temperature Reset 4–20 mA Signal	Disable function
SPA	PSIO1	Suction Pressure Circuit A	Circuit shut down
SPB	PSIO1	Suction Pressure Circuit B	Circuit shut down
TLEV_A	PSIO1	Cooler Level Sensor Circuit A	Control EXV-A by discharge superheat
TLEV_B	PSIO1	Cooler Level Sensor Circuit B	Control EXV-B by discharge superheat
TMTR_A1	CPMA1 † CPM1 ‡	Compressor A1 Motor Thermistor	Compressor shut down
TMTR_A2	CPMA2 † CPM2 ‡	Compressor A2 Motor Thermistor	Compressor shut down
TMTR_B1	CPMB1 † CPM1 ‡	Compressor B1 Motor Thermistor	Compressor shut down
TMTR_B2	CPM2 ‡	Compressor B2 Motor Thermistor	Compressor shut down
T_SPACE	PSIO2	External Space Temperature Thermistor	Disable function
VALVE_A	PSIO2	Water Valve Control Circuit A	Circuit shut down
VALVE_B	PSIO2	Water Valve Control Circuit B	Circuit shut down

Notes: † - HN67LM100
‡ - HN67LM101/30GX503191
§ - 30GX
* - 30HX

If this condition is encountered, check the following items:

- Check for a COMM3 wiring error. Check to be sure that the COMM3 plug is inserted into the correct connector.
- Check the modules to be sure that their addresses are set correctly.
- Check for proper power to the devices.
- If the hardware points are connected to the PSIO2 module, check for a faulty module. With a volt-ohm meter check the resistance from COMM3-1 to ground and COMM3-3 to ground. It should read approximately 1,500 and 1,000 Ω respectively. When checking voltage output, COMM3-1 to COMM3-2 should read between 3 to 4 vdc, COMM3-3 to COMM3-2 should read between 0.5 to 0.7 vdc.

- If the hardware points are connected to the DSIO-EXV, check for a faulty module. With a volt-ohm meter check the resistance from COMM3-1 to ground and COMM3-3 to ground. It should read approximately 14,400 Ω. COMM3-3 to Ground, COMM3-4 to Ground, and COMM3-2 to COMM3-4 should all read 0 Ω.
- Review the hardware points list. If all points are connected to the PSIO2, consider replacing the PSIO2 with a HK50AA023 module. Be sure to RAM flush the memory and set the proper address. This module is more noise resistant.

37 – Circuit A Low Saturated Suction Temperature Alert
38 - Circuit B Low Saturated Suction Temperature Alert
Action taken by control: Circuit shut down
Reset Method: Manual (PSIO)

This alarm will be generated when the Saturated Suction Temperature for the circuit is sustained at 6 °F (3.3 °C) below the Brine Freeze Point for 3 minutes. Before the machine alerts, the control will attempt to correct the situation by opening the EXV to allow for more refrigerant into the cooler to raise the suction pressure. The control will also signal an operational mode, "Low Cooler Suction Temperature". In this mode, the circuit will not load further.

With the introduction of Version 13 software (Starting Serial Number 0200F) a one (1) hour prohibition timer was added to the controls after this alarm is indicated. The alert cannot be reset until one (1) hour has elapsed. Versions prior to 15 did not reset after the 1 hour prohibition timer had expired.

If this condition is encountered, check the following items

- Check the liquid line strainer for restrictions. 30GX080-176 machines have cleanable strainers starting with serial number 0899F. 30HXA076-271 and 30HXC076-186 have cleanable strainers starting with serial number 1299F. 30HXA076-146 and 30HXC076-146 use a smaller strainer than the other machines. This has been known to restrict the flow over time at the outlet. There is very little flow over the outside surface of the basket. To resolve this, a dimple was added to the basket assembly.
- Check the charge of the machine.
- Check the EXV/Economizer operation. Check the EXV/Economizer Cable for shorts. A new sealed EXV cable was implemented for these machines 1999F.
- In economized circuits, if the motor temperature is cold, check for a sunk float. Version 7 software added a pumpout routine at start-up.
- On 30HX machines, be sure that the bubbler tube shut-off valve is open.
- Check the head pressure control method, if the condition occurs during low ambients.
- Check the water flow for the cooler. Low water flow can cause this alarm.
- Check the loop volume and flow rate. Rapid changes in load can cause this alarm. Consider increasing the Dead Band Multiplier under [3][SRVC].

- For Brine applications, check the Brine Freeze Point [6][SRVC]. It should be set slightly above the temperature to which the loop is protected. Brine has poorer heat transfer properties causing the suction temperature to decrease to maintain the capacity.
- For 30HXA machines, check to be sure that the liquid line solenoid valves are wired in conjunction with the compressor contactors.
- If the software version is 13 or 14, upgrade the software to at least version 15 to allow for the alarm to be reset.

Service Bulletins pertaining to this condition:

- SMB980008 – 30GX/HX Upgrade Program
  This program included the upgrade of all machines to Version 7 software. This version added logic to reduce the time that the machine was in a low saturated suction temperature condition.
- SMB980076 – 30HXA Liquid Line Solenoid Valves
  This bulletin described the proper connection of the liquid line solenoid valves for the 30HXA machines.
- SMB990026 – Economizer Cable Failures
  This bulletin was superceded by SMB990026A.
- SMB990026A – Economizer Cable Failures
  This bulletin was superceded by SMB990026B.
- SMB990026B – 30 Series EXV/Economizer Cables
  This bulletin advised the new part number for the EXV cable. The bulletin incorrectly provided the EXV Cable part number. The correct number is 32GB660010.
- SMB990030 – 30GX/HX Refrigerant Strainers
  This bulletin superceded by SMB000015.
- SMB990051 – 30GX/HX EXV Motor Replacement
  This bulletin described the corrected the connection diagram provided with the RCD replacement EXD motor instructions.
- SMB000015 – 30GX/HX Refrigerant Strainers
  This bulletin superceded SMB990030 and addressed the addition of the cleanable strainers.
- SMB000022 – 30GX/HX Upgrade Program
  This program included the upgrade of all 30GX machines to Version 15 software and 30HX machines with Version 14. Also included was the Economizer Cable upgrade for all economized units, prior to 1999F.
- SMB000026 – 30GX/HX Software Revisions
  This bulletin addressed the numerous software changes that have occurred over the life of this software.
- SMB010012 – 30HXA/HXC076-146 Liquid Line Strainer Change
  This bulletin advised of the new strainer assembly for the 30HXA/HXC076-146 machines.

40 – Compressor A1 Low Oil Pressure Alert
41 – Compressor A2 Low Oil Pressure Alert
42 – Compressor B1 Low Oil Pressure Alert
43 – Compressor B2 Low Oil Pressure Alert
Action taken by control: Affected compressor shut down
Reset Method: Manual (PSIO)

This alarm is generated if the oil pressure is below the set point for a specified period of time. The alert criteria is listed below:

In the formulas below, P_D is Discharge Pressure, P_E is Economizer Pressure, P_O is Oil Pressure, P_S is Suction Pressure.

On time less than 5 seconds
Oil pressure is ignored

(Software prior to Version 9)
On time between 5 and 30 seconds
The alert will be generated if the following condition is true for 3 consecutive readings.

$(P_O – P_E) <$ [15 psig/30 seconds] x [Compressor Run Time in seconds].

On time greater than 30 seconds
The alert will be generated if one of the following conditions is true

$(P_O – P_E) < 15$ psig for 15 seconds
$(P_O – P_S) <$ Oil Set Point 2 for 15 seconds

Oil Set Point 2 has several conditions.
$(P_D – P_S) <125$ psi
Oil Set Point 2 = $0.235(P_D – P_S) + 0.588$ psig
$125 \leq (P_D – P_S) <165$ psig
Oil Set Point 2 = $2(P_D – P_S) – 220.0$ psig
$(P_D – P_S) \geq 165$ psi
Oil Set Point 2 = $0.6364(P_D – P_S) + 5$ psig

(Software Version 9 or higher)
On time between 5 and 120 seconds
The alert will be generated if the following condition is true for 3 consecutive readings.

$(P_O – P_E) <$ [15 psig/120 seconds] x [Compressor Run Time in seconds].

On time greater than 120 seconds

The alert will be generated if one of the following conditions is true

$(P_O - P_E) < 15$ psig for 15 seconds
$(P_O - P_S) <$ Oil Set Point 2 for 15 seconds

Oil Set Point 2 has several conditions.

$(P_D - P_S) < 125$ psig
Oil Set Point 2 = $0.235(P_D - P_S) + 0.588$ psig
$125 \leq (P_D - P_S) < 165$ psig
Oil Set Point 2 = $2(P_D - P_S) - 220.0$ psig
$(P_D - P_S) \geq 165$ psig
Oil Set Point 2 = $0.6364(P_D - P_S) + 5$ psig

With the implementation of the magnetic drive oil pumps, the software was modified to allow the oil pump to act as a boost pump in addition to a pre-lube pump. This was implemented in version 10 software. The original oil pump KK82TA001, is not be able to generate the additional pressure due to its lower volume flow rate.

If this condition is encountered, check the following items:

- On 30HXC machines, consider head pressure control. If the entering condenser water is less than 70 °F (21 °C), the machine should have a water regulating valve installed.
- Check the refrigerant charge. Low charge conditions will reduce the discharge pressure for the machine, thereby lowering the starting point for the oil pressure. On economized machines, this condition compounds the problem by increasing the economizer pressure as hot gas enters the economizer shell from a lack of a liquid seal.
- Check the internal and external oil filter pressure drops. Change as necessary.
- On the non-magnetic drive pumps, a strainer was installed upstream of the pump. Check for a restriction in the strainer.
- Check all oil line service valves to be sure that they are open.
- Check the operation of oil solenoid valve.
- Check the back pressure valve to be sure that the piston is not leaking into the ¼" communication line. If the piston is leaking the discharge pressure can artificially raise the economizer pressure. On 30GX and 30HXA machines produced prior to 1698F, the back pressure valve did not have a seal around the piston, and was susceptible to this condition.
- Compressors with serial numbers prior to 5199J were equipped with a separate oil check valve. Check to be sure that it is not stuck.
- If the unit is equipped with a suction service valve, check to be sure that the suction service valve is open. Software revisions prior to version 13 will alarm on low oil pressure if the suction service valve is closed. Check to be sure that the suction service valve is locked in place.
- If the filters are plugging rapidly, have a filter analyzed for content. There have been reports filters plugging with filter drier media or metal particles from the discharge check valve. The filter drier is a granular design and has been known to

disintegrate. Discharge check valve failures can introduce metal filings into the oil, which are collected by the oil filters.
- Check the transducer calibration. All of the transducers are used in the oil pressure set point selection.
- If the software version is less than Version 9, consider upgrading the software. At Version 9, the initial ramp time was increased from 30 to 120 seconds.
- If the software is less than version 13, consider upgrading the software. Software Version 13 and higher has multiple oil solenoid valve open commands. Some machines have experienced data collisions, resulting in a failure to open the oil solenoid.

Service Bulletins pertaining to this condition:
- SMB980073 – Suction Service Valve Handle
  This bulletin described the revision to the suction service valve handle with the lock nut included.
- SMB990003 – 06N Oil Solenoid Valve Changes
  This bulletin described the changes to the 06N compressor oil solenoid valve.
- SMB990015 – 06N Discharge Check Valve Failures
  This bulletin was superceded by SMB990015A.
- SMB990015A – 06N Discharge Check Valve Failures
  This bulletin described the failure mode of the discharge check valve and the repair procedure.
- SMB990068 – 30GX/HX Replacement External Oil Filter History
  This bulletin was superceded by SMB990068A.
- SMB990068A – 30GX/HX Replacement External Oil Filter History
  This bulletin was superceded by SMB000060.
- SMB000026 – 30GX/HX Software Revisions
  This bulletin addressed the numerous software changes that have occurred over the life of this software.
- SMB000060 – 30GX/HX Replacement External Oil Filter History
  This bulletin addressed the numerous changes to the external filter.
- SMB010008 – 06N Internal Oil Filters Plugging
  This bulletin described the problem with the motor cooling filter drier disintegrating during operation.

44 - Circuit A Condenser Freeze Protection Alarm
45 - Circuit B Condenser Freeze Protection Alarm
Action taken by control: Machine shut down, Condenser Water Pump is commanded ON if chiller is off.
Reset Method: Automatic

This alarm is valid for 30HXC chillers only. It is ignored if the chiller is configured for brine duty. The alarm is generated if the control senses the Saturated Condensing Temperature is less than 34 °F (1 °C).

If this condition is encountered, check the following items:
- Check the discharge pressure transducer for accuracy. Calibrate the transducer if necessary.
- Check the discharge pressure transducer wiring for an error.
- Check the refrigerant charge for the circuit. Loss of refrigerant charge will cause this alarm.
- If this alert has occurred on non-water cooled machine, check the unit configuration for a proper unit type.

46 - Cooler Freeze Protection Alarm
Action taken by control: Machine shut down, Cooler Water Pump is commanded ON if chiller is off.
Reset Method: Automatic/Manual (PSIO)

The alarm is generated if the control senses either the Leaving Water or Entering Water Thermistor less than the Brine Freeze Point. For fresh water, the freeze point is 34 °F (1 °C). For brines, the freeze point is Cooling Set Point minus 8 °F (4.4 °C). The alarm will reset once the leaving water temperature rises 6 °F (3.3 °C) above the set point. This alarm will reset automatically if the condition corrects itself the first time. If the alarm is indicated again on the same date, the alarm is a manual reset.

If this condition is encountered, check the following items:
- Check for a faulty thermistor.
- Check the thermistor wiring.
- Check the chilled water flow rate.

Service Bulletins pertaining to this condition:
- SMB990029 – Thermistor Improvements
  This bulletin described the changes made to the design of the thermistor to improve its reliability.

47 - Circuit A High Saturated Suction Temperature Alert
48 - Circuit B High Saturated Suction Temperature Alert
Action taken by control: Circuit shut down
Reset Method: Manual (PSIO)

This alert algorithm is active only after 90 seconds of operation has elapsed. The alert will be generated if the Saturated Suction Temperature is greater than 55 °F (12.8 °C) and the EXV position is less than 1% for 5 minutes.

If this condition is encountered, check the following items:
- Check the EXV for proper operation.
- Check the Liquid Level Sensor for proper operation.
- Check the suction pressure transducer calibration and wiring.

- If a contactor failure x.75 alert is indicated but the compressor is not operational, the control will assumes the circuit is operational and continues to operate the EXV. Without the compressor operating, the cooler fills with liquid, raising the saturated suction temperature to the alert limit.

Service Bulletins pertaining to this condition:

- SMB000022 – 30GX/HX Upgrade Program
  This program included the upgrade of the Compressor Protection Module to at least Revision 29A software.

49 – Loss of Condenser Flow Alarm
Action taken by control: Machine shut down
Reset Method: Manual (PSIO)

This alarm is generated if the flow switch does not close within 1 minute after the pump is started or if the switch opens for more than 10 seconds during normal operation.

If this condition is encountered, check the following items:

- Check condenser water flow.
- Check condenser water flow switch.
- Check condenser water pump.
- If the machine is installed with a condenser water regulating valve, consider disabling the condenser flow switch.

50 – Illegal Configuration x Alarm
Action taken by control: Machine not allowed to start
Reset Method: Manual (PSIO)

This alarm is generated if control detects an illegal configuration. The error must be corrected before the machine can be started. Within the alarm code will be one of the following codes to indicate the illegal configuration.

Code Number	Illegal Configuration Description
1	Incorrect check sum in Configuration Code (Factory or Service Code)
2	Unit Type outside range of 1-3
3	Number of compressors in a circuit outside the range of 0-2
4	Air-cooled chiller with a fan type outside the range of 1-16
5	Air-cooled chiller with Low Temperature Brine Fluid
6	Water-cooled chiller configured for air-cooled head pressure control
7	Selecting both Outside Air Temperature and Space Temperature sensors for External Reset operation
8	Air-cooled chiller with condenser water pump
9	Air-cooled chiller with condenser thermistors
10	Maximum Operating Pressure Set Point is outside the range of 40 to

	55 °F (4.4 to 12.8 °C)
11	Maximum Condensing Temperature Set Point (MOP_SP) is out side the range of 0 to 158 °F (-17.8 to 70 °C)

If this condition is encountered, check the following items:
- Correct the configuration as noted above.

51 – Initial Configuration Required Alarm
Action taken by control: Machine not allowed to start
Reset Method: Manual (PSIO)

This alarm is generated if control detects no configuration information. The configuration must be entered before the machine is allowed to start.

If this condition is encountered, check the following items:
- Configure the machine.

52 – Unit is in Emergency Stop Alarm
Action taken by control: Machine shut down
Reset Method: CCN/Automatic

This alarm is generated when a CCN command for the machine to shut down is received.

If this condition is encountered, check the following items:
- Check for an illegal configuration.
- Be sure that Emergency Stop [2][STAT] is set for EMSTOP. If this value is ENABLE, a CCN command will be required to remove the force.

53 – Cooler Pump Interlock Failure Contacts Failed to Close at Start-Up Alarm
Action taken by control: Machine shut down, Pump turned off
Reset Method: Automatic

This alarm will be generated if the interlock circuit did not close within 1 minute of operation on software versions prior to version 13. Version 13 increased this time to 90 seconds for proof-of-flow.

If this condition is encountered, check the following items:
- Check the chilled water flow switch operation and insure it was properly set-up.
- Check for an electrical ground at the flow switch or the wiring.
- Check the Cooler Pump Interlock circuit for proper wiring.
- Check for proper chilled water flow
- Check the cooler pump operation.

54 – Cooler Pump Interlock Failure Contacts Open During Normal Operation Alarm
Action taken by control: Machine shut down, Pump turned off
Reset Method: Automatic

This alarm will be generated if the interlock circuit opens for at least 5 seconds.

If this condition is encountered, check the following items:
- Check the chilled water flow switch for proper operation.
- Check the chilled water loop to be sure that it is completely filled with water.
- Check the chilled water pump interlock circuit for proper operation
- Check the pump electrical circuit for power.
- Check the pump circuit breaker
- Check the pump contactor for proper operation.
- Check the chilled water pump for proper operation. Look for overload trips.
- Check the chilled water strainer for a restriction.
- Check to be sure that all isolation valves are open completely.

55 – Cooler Pump Interlock Failure Contacts Closed when Cooler Pump is Off Alarm
Action taken by control: Machine not allowed to start, Pump remains off
Reset Method: Manual (PSIO)

This alarm algorithm is active only while the machine is off and Cooler Pump Control (Options Configuration 2, [2][SRVC]) is ON. The alarm will be generated if the interlock circuit is closed for more than 30 seconds when the cooler pump is off.

If this condition is encountered, check the following items:
- Check the chilled water flow switch operation and insure it was properly set-up. On multiple unit systems, the chilled water pump interlock should be installed in series with the chilled water flow switch.
- Check for an electrical ground at the flow switch or the wiring.
- Check the Cooler Pump Interlock circuit for proper wiring.
- Check the cooler pump operation.
- Check the chilled water pump contactor.

56 – Loss of Communication with WSM Alert
Action taken by control: Machine allowed to run under local control. The WSM forces are removed.
Reset Method: Automatic

This alarm will be generated if the PSIO1 has not received a command from the WSM for 5 minutes after a transmission.

If this condition is encountered, check the following items:
- Check the configuration of the WSM, be sure that the addresses agree.
- Check the COMM1 wiring for a proper connection and wiring. Be sure that the plugs are securely seated.
- Check for a faulty WSM or PSIO1.
- Check for proper power to the devices.

57 - Circuit A Liquid Level Sensor Failure Alert
58 - Circuit B Liquid Level Sensor Failure Alert
Action taken by control: Circuit continues to run under Discharge Superheat Control
Reset Method: Manual (PSIO)

This alert is generated if the liquid level sensor thermistors indicate a temperature of greater than 245 °F (118 °C) or –40 °F (-40 °C) with a saturated suction temperature greater than 9 °F (-12.8 °C). If one of these conditions are indicated, the circuit will alert. The circuit will continue to operate under discharge superheat control.

If this condition is encountered, check the following items:
- Check for a faulty liquid level sensor, heater or thermistors.
- Check for a wiring error of the liquid level sensor

59 – Compressor A1 Pre-Start Oil Pressure Alert
60 – Compressor A2 Pre-Start Oil Pressure Alert
61 – Compressor B1 Pre-Start Oil Pressure Alert
62 – Compressor B2 Pre-Start Oil Pressure Alert
Action taken by control: Circuit not allowed to start
Reset Method: Manual (PSIO)

This alarm is generated after two attempts at starting. When a call for cooling is received, the oil pressure transducer is read and its value stored. The circuit oil pump is started and operates for 20 seconds. After the 20 second operation, the Oil Pressure Transducer reading is checked again and compared to the initial reading. If the difference between the two readings is 2.5 psi (17 kPa) or less, the oil solenoid is opened. The oil pressure is measured again. If the pressure is not greater than 2.5 psi (17 kPa), the oil solenoid is closed and the circuit is reset. The circuit will remain off for 20 seconds. The oil pump is started and the sequence repeated. On the second attempt, if the oil pressure is not greater than 1.5 psi (10.3 kPa) the alarm is generated. This alert algorithm is active for the lead compressor during start-up only.

For lag compressor start-up, the oil solenoid is opened. If the oil pressure is at less than or equal to the initial oil pressure the alert is generated.

If this condition is encountered, check the following items:
- Check the internal and external oil filter pressure drops. Change as necessary.
- On the non-magnetic drive pumps, a strainer was installed upstream of the pump. Check for a restriction in the strainer.
- Check all oil line service valves to be sure that they are open.
- Check the operation of oil solenoid valve.
- Compressors with serial numbers prior to 5199J were equipped with a separate oil check valve. Check to be sure that it is not stuck.
- If the filters are plugging rapidly, have a filter analyzed for content. There have been reports filters plugging with filter drier media or metal particles from the discharge check valve.
- Check the calibration of the oil pressure transducer.
- Check the oil solenoid. If the oil solenoid stem is bent, it may not close or open completely and may or may not allow the oil to enter compressor.

63 – Circuit A&B OFF for Alerts. Unit down Alarm
Action taken by control: None
Reset Method: Automatic

This alarm will be generated if there are 1 or more alerts active on each circuit. Alarms are only sent on the CCN bus. Alerts are not sent on the CCN bus. To broadcast the problem, the alarm was created.

If this condition is encountered, see the individual alerts and correct those conditions that lead to the alert.

64 - Circuit A Loss of Charge Alert
65 - Circuit B Loss of Charge Alert
Action taken by control: Circuit shut down
Reset Method: Manual (PSIO)

This alert is generated if the control senses a discharge pressure less than 10 psi (68.3 kPa) for 30 seconds.

If this condition is encountered, check the following items:
- Check the discharge pressure transducer calibration and its operation.
- Check the refrigerant charge for the circuit.

66 – Loss of Communication with FSM Alert
Action taken by control: Machine allowed to run under local control. The FSM forces are removed.
Reset Method: Automatic

This alarm will be generated if the PSIO1 has not received a command from the FSM for 5 minutes after a transmission.

If this condition is encountered, check the following items:
- Check the configuration of the FSM, be sure that the addresses agree.
- Check the COMM1 wiring for a proper connection and wiring. Be sure that the plugs are securely seated.
- Check for a faulty FSM or PSIO1.
- Check for proper power to the devices.

67 - Circuit A High Discharge Pressure Alert
68 - Circuit B High Discharge Pressure Alert
Action taken by control: Circuit shut down
Reset Method: Automatic/Manual (PSIO)

This alert is generated if the control senses a Saturated Condensing Temperature greater than the Maximum Condensing Temperature Set Point by more than 5 °F (2.8 °C). This alarm will reset automatically if the condition corrects itself the first time. If the alarm is indicated again on the same date, the alarm is a manual reset.

If this condition is encountered, check the following items:
- Check the discharge pressure transducer calibration and its operation.
- Confirm the proper value for the Maximum Condensing Temperature Set Point, [1][SRVC].
- Check the refrigerant charge for the circuit.
- Check for non-condensables in the circuit.
- Check for an airside restriction for air-cooled chillers. Check fan operation for proper airflow.
- Check for a water flow restriction for water-cooled chillers. Check condenser pump for proper operation.

70 – High Leaving Chilled Water Temperature Alert
Action taken by control: None.
Reset Method: Automatic

This alarm will be generated if the Leaving Chilled Water Temperature is greater than the LCW Delta Alarm Limit [1][SET] and the machine capacity at 100% with the Leaving Chilled Water temperature is greater than it was 1 minute ago.

If this condition is encountered, check the following items:
- Check the water flow for the chiller.
- Confirm that the load is not greater than the capacity of the machine.

- Check the compressor operation. Be sure that it is fully loaded. Check the unloader solenoids.
- Check for other alarms or alerts.
- Check for cooler fouling.

71 - Circuit A Low Oil Level/Flow Alert
72 - Circuit B Low Oil Level/Flow Alert
Action taken by control: Circuit shut down
Reset Method: Manual (PSIO)

In the early stages of the design work, the 30HXC machines were designed with a flow switch that was never implemented into production. The alert label was created during the development phase when there was a flow switch in the circuit.

The alert is generated when one of two conditions is satisfied. If the circuit is off, the alert will be generated when the oil level switch float opens indicating not enough oil in the sump. The alert will be generated if the circuit is active and the oil level switch opens for 10 seconds.

Software prior to Version 5 generated the alarm on the first occurrence. Version 5 software added logic to shut down the machine if the switch opened and automatically start again once the switch made. The alarm will only be a manual reset after the 4th alert on the same date.

If this condition is encountered, check the following items:
- Check the circuit for rapid cycling. The system will recover the oil in the circuit more efficiently under full load. If the machine is cycling rapidly, increase the Deadband Multiplier [3][SRVC]. It is shipped from the factory at 1.0.
- Check the oil level switch for proper operation.
- On single-compressor circuit 30HXC machines produced between 1896F and 4397F, the oil pick-up tube in the separator interfered with the operation of oil level switch. Consider modifying the oil pick-up tube assembly.
- Check for a wiring error.
- Check the DSIO-EXV for a bad monitoring channel.
- On 30GX machines, check the York mesh to be sure that it is not interfering with the operation of the float.
- If the problem occurs at shutdown, check the oil solenoid. If the oil solenoid stem is bent, it may not close completely and will allow the oil to leave the oil separator.

To recover the oil, use the oil recovery procedure outlined in the Service section. Add additional oil to the circuit to close the oil level switch. The added oil may need to be removed from the system later.

If the alert condition continues, consider adding ½ gallon of oil to the circuit. Continue adding oil in ½ gallon increments to a maximum of 1-½ gallons. Do not overcharge the oil system. The extra oil will accumulate in the cooler, fouling the cooler.

Service Bulletins pertaining to this condition:
- SMB970027 – Oil Level Switch 30HXC
  Early versions of the oil level switch experienced erratic operation. The switch was redesigned with a stronger magnet.
- SMB970038 – Oil Level Switch Bypass 30HX/GX
  Early instructions advised the service technician to jumper the oil level switch. This resulted in compressor failures and a change in the procedure.
- SMB980002 – Oil Level Switch Tubing Modification – Water-Cooled Screw Chillers
  This bulletin advised of an upgrade to the oil level/feed piping for single compressor circuits only. The original design could cause the float in the level switch chamber to fall as the oil level is removed from the tube by the oil pump.
- SMB980008 – 30GX,HX Software Upgrade
  This bulletin advised the upgrade of the software. The oil level switch alarm only locked the machine off, if the alarm occurred 4 times in a 24 hour period.

73 - Circuit A Low Discharge Superheat Alert
74 - Circuit B Low Discharge Superheat Alert
Action taken by control: Circuit shut down
Reset Method: Manual (PSIO)

This alert is generated when the control measures a discharge superheat less than 5 °F (2.8 °C) for 10 minutes.

If this condition is encountered, check the following items:
- Check the Discharge Gas Thermistor for accuracy.
- Check the Discharge Pressure Transducer for accuracy. Calibrate the transducer as necessary.
- Check the economizer EXV for proper operation. Overfeeding can cause this alarm.
- Check the economizer for a sunk or stuck float. This causes all of the liquid refrigerant to enter the motor cooling port. There is not enough heat in the motor to vaporize the liquid, depressing the discharge superheat.
- Check the Motor Temp Set Point [1][SRVC]. It should be set for 200 °F (93 °C). If the set point is lowered, the control will attempt to control to that point causing this alert.
- Check the liquid level sensor for proper operation.
- Check for a failed open motor cooling solenoid.
- On economized units with suction service valves, check to be sure that the suction service valve is open.

Service Bulletins pertaining to this condition:
- SMB990026 – Economizer Cable Failures

This bulletin was superceded by SMB990026A.

- SMB990026A – Economizer Cable Failures
  This bulletin was superceded by SMB990026B.
- SMB990026B – 30 Series EXV/Economizer Cables
  This bulletin advised the new part number for the EXV cable. The bulletin incorrectly provided the EXV Cable part number. The correct number is 32GB660010.
- SMB990051 – 30GX/HX EXV Motor Replacement
  This bulletin described the corrected the connection diagram provided with the RCD replacement EXD motor instructions.
- SMB990072A – 06N Motor Temperature Operating Limits
  This bulletin described the operating limits for the compressor and the actions taken by the control system at various points.
- SMB000022 – 30GX/HX Upgrade Program
  This program included the upgrade of all 30GX machines to Version 15 software and 30HX machines with Version 14. Also included was the Economizer Cable upgrade for all economized units, prior to 1999F.
- SMB000026 – 30GX/HX Software Revisions
  This bulletin addressed the numerous software changes that have occurred over the life of this software.

75 – Compressor A1 Max. Oil Delta P, Check Oil Line Alert
76 – Compressor A2 Max. Oil Delta P, Check Oil Line Alert
77 – Compressor B1 Max. Oil Delta P, Check Oil Line Alert
78 – Compressor B2 Max. Oil Delta P, Check Oil Line Alert
Action taken by control: Affected compressor shut down
Reset Method: Manual (PSIO)

This alarm is generated if the difference between the discharge pressure and the oil pressure is greater than 100 psi (683 kPa) for more than 5 seconds.

If this condition is encountered, check the following items:

- Check the internal and external oil filter pressure drops. Change as necessary.
- On the non-magnetic drive pumps, a strainer was installed upstream of the pump. Check for a restriction in the strainer.
- Check all oil line service valves to be sure that they are open.
- Check the operation of oil solenoid valve.
- Compressors with serial numbers prior to 5199J were equipped with a separate oil check valve. Check to be sure that it is not stuck.
- If the filters are plugging rapidly, have a filter analyzed for content. There have been reports filters plugging with filter drier media or metal particles from the discharge check valve.
- Check the transducer calibration. All of the transducers are used in the oil pressure set point selection.

- If the software is less than version 13, consider upgrading the software. Software Version 13 and higher has multiple oil solenoid valve open commands. Some machines have experienced data collisions, resulting in a failure to open the oil solenoid.

Service Bulletins pertaining to this condition:

- SMB990003 – 06N Oil Solenoid Valve Changes
  This bulletin described the changes to the 06N compressor oil solenoid valve.
- SMB990015 – 06N Discharge Check Valve Failures
  This bulletin was superceded by SMB990015A.
- SMB990015A – 06N Discharge Check Valve Failures
  This bulletin described the failure mode of the discharge check valve and the repair procedure.
- SMB990068 – 30GX/HX Replacement External Oil Filter History
  This bulletin was superceded by SMB990068A.
- SMB990068A – 30GX/HX Replacement External Oil Filter History
- This bulletin was superceded by SMB000060.
- SMB000026 – 30GX/HX Software Revisions
  This bulletin addressed the numerous software changes that have occurred over the life of this software.
- SMB000060 – 30GX/HX Replacement External Oil Filter History
  This bulletin addressed the numerous changes to the external filter.
- SMB010008 – 06N Internal Oil Filters Plugging
  This bulletin described the problem with the motor cooling filter drier disintegrating during operation.

79 – Compressor A1 Failed Oil Solenoid Alert
80 – Compressor A2 Failed Oil Solenoid Alert
81 – Compressor B1 Failed Oil Solenoid Alert
82 – Compressor B2 Failed Oil Solenoid Alert
Action taken by control: Affected compressor shut down
Reset Method: Manual (PSIO)

When a call for cooling is received, the Differential Oil Pressure, DOP (Oil Pressure – Economizer Pressure) is read and its value stored. The differential is used to compensate for changing water temperatures. The circuit oil pump is started and operates for 20 seconds. After the 20 second operation, the Oil Pressure Differential reading is checked again and compared to the initial reading. If the difference between the two readings, (DOP_{t+20} - DOP_t) is greater than 2.5 psi (17 kPa), the oil solenoid is assumed to have failed open and the alert is generated. This alert algorithm is active during lead compressor start-up only. It does not apply to the lag compressor of the circuit, once the lead compressor is operational.

With the introduction of Version 17 software, the alert trip point was raised from 2.5 psi (17 kPa) to 5 psi (34 kPa).

If this condition is encountered, check the following items:
- Check the operation of oil solenoid valve. Carlyle had a vendor problem with the oil solenoid manufacturer Parker with compressor date codes 4499J, 0700J, 0800J, 0900J. The suspect solenoid valves have a seal that may allow oil to leak by. Parker production dates close to these serial numbers should also be suspect.
- Check the calibration of the economizer and oil pressure transducer. Replace the transducer(s) if necessary.
- Consider upgrading the software to Version 17.

Service Bulletins pertaining to this condition:
- SMB990003 – 06N Oil Solenoid Valve Changes
  This bulletin described the changes to the 06N compressor oil solenoid valve.

83 – Compressor A1 High Oil Filter Pressure Drop Alert
84 – Compressor A2 High Oil Filter Pressure Drop Alert
85 – Compressor B1 High Oil Filter Pressure Drop Alert
86 – Compressor B2 High Oil Filter Pressure Drop Alert
Action taken by control: Affected compressor shut down
Reset Method: Manual (PSIO)

This alarm was added with the introduction of version 16 software. Version 16 has a software bug that checks for the filter pressure drop when the circuit is on, regardless of whether or not the compressor is operational. This alarm is generated if the oil filter pressure drop (Discharge Pressure – Oil Pressure) is exceeds 25 psid (172 kPa) for 30HXC machines, or 30 psid (207 kPa) for 30GX and 30HXA machines.

If this condition is encountered, check the following items:
- Check the oil filter pressure drops, change as necessary. If the filters are plugging rapidly, have a filter analyzed for content. There have been reports filters plugging with filter drier media or metal particles from the discharge check valve. The filter drier is a granular design and has been known to disintegrate. Discharge check valve failures can introduce metal filings into the oil, which are collected by the oil filters.
- Check the operation of oil solenoid valve.
- Check the calibration of the discharge and oil pressure transducer.
- Check the software version. If the software version is 16, upgrade the software.

Service Bulletins pertaining to this condition:
- SMB990003 – 06N Oil Solenoid Valve Changes
  This bulletin described the changes to the 06N compressor oil solenoid valve.
- SMB990015 – 06N Discharge Check Valve Failures
  This bulletin was superceded by SMB990015A.
- SMB990015A – 06N Discharge Check Valve Failures

This bulletin described the failure mode of the discharge check valve and the repair procedure.

- SMB990068 – 30GX/HX Replacement External Oil Filter History
  This bulletin was superceded by SMB990068A.
- SMB990068A – 30GX/HX Replacement External Oil Filter History
  This bulletin was superceded by SMB000060.
- SMB000060 – 30GX/HX Replacement External Oil Filter History
  This bulletin addressed the numerous changes to the external filter.
- SMB010008 – 06N Internal Oil Filters Plugging
  This bulletin described the problem with the motor cooling filter drier disintegrating during operation.

87 - Loss of Refrigerant Flow on Circuit A
88 - Loss of Refrigerant Flow on Circuit B
Action taken by control: Affected circuit shut down, restart attempted 1 additional time.
Reset Method: Manual (PSIO)

With the introduction of Software Version 17, a no refrigerant flow algorithm was added to the software logic. At compressor start, if SST is less than 0 °F (-18 °C) and if Saturated Suction Temperature rate of change is negative (in 5 second increments) at any time between 40 and 90 seconds of runtime, the compressor will shut off. If the circuit started above 0 °F (-18 °C), the algorithm will not start until the circuit goes below 0 °F (-18 °C) for at least 5 seconds and trending negative. After 15 minutes, the compressor start will be attempted again. If the pass criterion is not met, the compressor will be shutdown and the control will generate a no flow alarm.

If this condition is encountered, check the following items:

- Check the liquid line strainer to be sure that it is not causing a restriction
- Check the liquid line service valve to be sure that it is open
- Check the liquid line solenoid valves for proper operation.
- Check the EXV motor for proper operation.
- Check the Economizer Float/Motor for proper operation.
- Check the circuit refrigerant charge. Low refrigerant charge conditions can lead to this alarm.

Although this alert was created to protect the compressor, the alert can be disabled. NOFLOWEN, *Enable No Flow Protection*, [2][SERV] is factory defaulted to “1”, Enable. To disable the algorithm, change the value to “0”, Disable.

Resetting Alarms and Alerts

The method to reset any alarm or alert depends upon the device that generated the alarm and the type of alarm or alert, automatic or manual. Before any alarm or alert is reset, first find the cause of the alarm or alert and correct the situation

Automatic Alarm or Alert:
An automatic alarm or alert will reset itself, without operator intervention if the condition corrects itself.

Manual Alarm or Alert:
One or more of the following methods must be used to reset the manual alarm or alert.

PSIO Alarms and Alerts
To reset a PSIO alarm or alert, once the condition has been corrected, from the HSIO, press [1][STAT] and [1][ENTER] to reset the alarm. If the Alarm Reset Select in [3][SRVC] is set to "1", the LOCAL-OFF-REMOTE switch can be switched from "LOCAL" or "REMOTE" to "OFF" for five seconds and back to the its original position to reset the alarm or alert.

Compressor Protection Module Alarms and Alerts:
Alarms and alerts generated by the Compressor Protection Module (CPM) require an additional step to reset. There are two different alarm/alert reset methods depending on the manufacturer of the CPM. The alarm must be cleared from the CPM first and then the PSIO.

HN67LM100 Compressor Protection Module: To reset a CPM alarm or alert, once the condition has been corrected, move the LOCAL-OFF-REMOTE switch to "OFF". Press and hold the reset button on the panel near the HSIO for a minimum of 5 seconds. This action will remove power to the CPM. If the Alarm Reset Select in [3][SRVC] is set to "1", the alarm will be cleared from the PSIO. If the Alarm Reset Select in [3][SRVC] is set to "0", the alarm or alert will still be in the active alarm set in the PSIO. To reset the PSIO alarm or alert from the HSIO, press [1][STAT] and [1][ENTER].

HN67LM101 and 30GX503191 Compressor Protection Module: Correct the condition that caused the alarm or alert first before resetting the alarm.

For all alarms and alerts other than x.95, press and hold the reset button on the CPM circuit board for a minimum of 3 seconds. This action will clear the alarm or alert from the affected circuit without shutting down the active circuit. Then follow the instructions for resetting the PSIO alarm.

For CPM alarm x.95, move the LOCAL-OFF-REMOTE switch to "OFF". Press and hold the reset button on the panel near the HSIO for a minimum of 5 seconds. This action will remove power to the CPM. If the Alarm Reset Select in [3][SRVC] is set to "1", the alarm will be cleared from the PSIO. If the Alarm Reset Select in [3][SRVC] is set to "0", the alarm or alert will still be in the active alarm set in the PSIO. To reset the PSIO alarm or alert from the HSIO, press [1][STAT] and [1][ENTER].

Back Pressure Valve
The 30GX and 30HXA machines have a back pressure valve installed at the exit of oil separator. The valve's purpose is to restrict the refrigerant flow to build a higher

discharge pressure and thus oil pressure. The valve's design incorporates a piston and spring. The spring insures a minimum of 15 psid (106 kPa) between the discharge and the economizer pressure.

A ¼-inch communication line between the back pressure valve and the economizer port is factory supplied on the 30GX machines. On the 30HXA machines, the communication line is field supplied and installed. Before being installed, the shrader valve core at both connection points must be removed before the communication line is installed. Failure to remove the shrader core will result in rapid oscillation of the back pressure valve piston as the pressure builds and releases. This also creates a banging noise in the valve body as the piston closes.

There have been several revisions to the back pressure valve design since its introduction.

The original back pressure valve, 30GX500252 was used in production from 1896F until 0198F. This valve was brazed in to the separator. On the 30GX machines, it was brazed into the top of the oil separator. On the 30HXA machines, it was brazed in to the separator at a 45° angle pointing toward the floor. The valve did not have a seal around the piston nor at the piston seat. These valves were prone to discharge gas leakage around the piston. This leakage artificially increased the economizer pressure. This increased pressure affects the oil pressure algorithm resulting in low oil pressure alarms. The lack of a piston seat seal requires a discharge line solenoid valve on the 30HXA machines to prevent refrigerant migration.

A service kit to replace the cylinder and piston with a seal was set-up in finished goods, 30HX-900---026. This kit included the instructions, 30HX500804 to replace the inner cylinder and piston. This kit is no longer available. No Service Manager's Bulletin issued with this information. If this condition is encountered, replace the valve with the 30HX500796 valve.

The 30HX500796 back pressure valve was used in production starting 0198F on the 30GX machines. On the 30HXA machines, the 30HX500796 back pressure valve was used in production starting 0198F unit 1598F. This valve was brazed in to the separator. On the 30GX machines, it was brazed into the top of the oil separator. On the 30HXA machines, it was brazed in to the separator at a 45° angle pointing toward the floor. This valve incorporated a seal around the piston and at the piston seat. Consequently, the discharge line solenoid valves on the 30HXA machines was removed.

Beginning 1698F on the 30HXA machines, the mounting of the back pressure valve was improved. A six-bolt flange mount was incorporated into the design. This new style mounting valve, 30HX500878 has all of the improvements in the 30HX500796 valve. The mounting flange surface is perpendicular to the floor. This improvement was made to allow for greater piping flexibility.

Chilled Water Flow Switch
A field installed chilled water flow switch is required for this machine. This is the only means of flow detection for the control system.

Beginning with serial numbers 4499F (30GX) and 4699F (30HXA/HXC) a factory provided chilled water flow switch was shipped with all machines. This paddle switch is to be field installed and wired.

The factory-supplied, vapor-proof, paddle-type flow switch is preferred over the differential pressure switches. The factory provided flow switch is Carrier Part Number, HR81LG005 (McDonnell & Miller P/N: FS8-W). The switch is rated for waterside pressures of 150 psig (1034 kPa), fluid and ambient temperatures down to 32 °F (0 °C) during operation. This switch is acceptable in lower ambients, if the chilled water loop is drained and winterized. If the application is outside of this range, a different flow switch must be field installed, Carrier Part Number, HR81LG010 (McDonnell & Miller P/N: FS7-4W) with a rating of 300 psig (2068 kPa), fluid and ambient temperatures down to -65 °F (-53 °C) must be purchased and installed. With both switches, the conduit connection to the flow switch must be sealed. Failure to do so will allow water to accumulate on the switch head. The flow switch still requires that the paddle be trimmed for the appropriate size pipe. See the manufacturer's instructions supplied with the switch.

Compressor

Service Bulletins pertaining to this issue:

- SMB0200?? –06N Compressor Return Procedures
  This bulletin describes the procedure for field return of 06N compressors and a procedure for a teardown analysis.
- SMB990037 – 06N Replacement Compressors
  This bulletin advised of an error printed in the Controls, Start-Up, Operation, Service, and Troubleshooting Book, previous to and including 30G,H-4T, and a sticker on the compressor which advises the servicer to contact Carlyle at a toll free phone number to obtain a replacement compressor. The telephone number listed does not connect the servicer to Carlyle Compressor Company.
- SMB960072 – Carlyle 06N Compressor Failure in 30GX & 30HX Chillers
  This bulletin described the field return procedure for the 06N compressors.

- PMB02-105 – Authorized Field Repairs and Parts Kits for 06N Screw Compressors
  This bulletin included a description of all authorized field repairs and part numbers.

Compression

Discharge Check Valve

The discharge check valve is located in the muffler casing of the compressor between the discharge port and the muffler assembly. The check valve is installed to prevent pressure equalization through a non-operating compressor.

The check valve is a mushroom-shaped part located in the internal muffler/discharge cavity. It is guided on a hardened dowel via a hole in the stem. The seal is achieved between the spherical top surface of the check valve and a conical seat in the outlet casing.

Beginning in October of 1997, Carlyle changed the discharge check valve on the 06N compressors from a machined part to a cast and machined part. In some cases, these cast and machined check valves have experienced wear. The hardened dowel pin has actually worn through the side of the stem, causing the valve to seat improperly. The cast and machined check valve is in all compressors, beginning with compressor serial number 4397J through 4698J. After 4698J, Carlyle returned to the fully machined check valve.

Troubleshooting:

- Compressor whine at shutdown.
  The refrigerant gas spinning the rotors backwards as the system pressures equalize through the compressor causes this whine. This backward rotation, unlike powered reverse rotation, is not detrimental to the compressor. However, in multiple compressor circuits, check valve leakage will significantly reduce capacity.

Check the following items:

- Check the discharge check valve for wear.

- Rapidly Plugging Oil Filters
  See “Compressor whine at shutdown.

- Ticking Noise at the compressor
  See “Compressor whine at shutdown.
  Check the suction service valve, if equipped to be sure that it is locked in position.

If a worn check valve is encountered, replace the check valve. If there is additional damage to the mating surface, RCD has the bearing cover with all necessary o-rings in a kit for field replacement.

Service Bulletins pertaining to this issue:

- SMB990015A – 06N Discharge Check Valve Failures
  This bulletin described the failure mode of the discharge check valve and the repair procedure.
- SMB990015 – 06N Discharge Check Valve Failures
  This bulletin was superceded by SMB990015A.

- PMB02-105 – Authorized Field Repairs and Parts Kits for 06N Screw Compressors
  This bulletin included a description of all authorized field repairs and part numbers.

Suction Screen

Compressors starting with Serial Number 3501J do not include the suction screen. The screen was removed as an efficiency improvement. If a screen is desired, it can be added.

The suction screen was added back to production compressors starting with Serial Number 1002J.

Electrical

Motor Terminal Pins

Electrical connections for the motor are made with terminal pins that extend outside of the compressor. There are 2 isolators and a rubber grommet that when pinched together by a lock washer and nut create the seal for the refrigerant circuit.

In rare cases, the compressor motor terminals have loosened to create a small leak. A torque procedure was developed and published under SMB990001 for field repair. In some instances, this procedure would not correct the problem. As a result a Repair Kit was developed with new seals and hardware to resolve the problem. The kit, 06NA6600026 is available through RCD.

Service Bulletins pertaining to this issue:

- SMB990001 – 06N Terminal Pin Field Torquing Procedure
  This bulletin described the process for the field to follow when tightening the Motor Terminal Pin on the 06N compressors.

- PMB02-105 – Authorized Field Repairs and Parts Kits for 06N Screw Compressors
  This bulletin included a description of all authorized field repairs and part numbers.

Lubrication System

Oil Level Switch

An oil level switch in the oil separator is used with both 30GX and 30HXA chillers. An external switch is used on the 30HXC machines

Service Bulletins pertaining to this condition:

- SMB970027 – Oil Level Switch 30HXC

Early versions of the oil level switch experienced erratic operation. The switch was redesigned with a stronger magnet.

- SMB970038 – Oil Level Switch Bypass 30HX/GX
  Early instructions advised the service technician to jumper the oil level switch. This resulted in compressor failures and a change in the procedure.

Oil Pick-Up

Service Bulletins pertaining to this condition:

- SMB980002 – Oil Level Switch Tubing Modification – Water-Cooled Screw Chillers
  This bulletin advised of an upgrade to the oil level/feed piping for single compressor circuits only. The original design could cause the float in the level switch chamber to fall as the oil level is removed from the tube by the oil pump.

Oil Solenoid Valve

An oil solenoid valve on the compressor controls the oil flow to the compressor internal components. The original oil solenoid valve was a simple solenoid valve. A check valve was located in the internal oil filter mounting fitting in the internal oil filter cavity.

Carlyle Compressor implemented a new style of oil solenoid valve, with an integral check valve in the body. This change will improve the compressor's ability to stop the oil flow from entering the filter cavity while changing the internal oil filter. The new solenoid can be found on compressors beginning with serial number 5098J. The new valve is physically different. If an old solenoid valve fails and is replaced with a new style solenoid valve, there are additional requirements that must be completed. The additional steps are outlined in RCD's Instruction Sheet, 99TA516057 which is sent with the new solenoid valve.

Service Bulletins pertaining to this issue:

- SMB990003 – 06N Oil Solenoid Valve Changes
  This bulletin described the oil solenoid valve changes implemented with the 06N compressors. The bulletin also included the instruction sheet for upgrading to the new style valve.
- PMB02-105 – Authorized Field Repairs and Parts Kits for 06N Screw Compressors
  This bulletin included a description of all authorized field repairs and part numbers.

Compressor Mufflers

In all machines there are two mufflers per circuit, one internal to the compressor and the other external.

Internal Muffler

The internal muffler is located in the discharge section of the compressor, downstream of the discharge check valve. The muffler is a plate that is not flat, such that when it is installed, it acts as a spring keeping it in place.

External Muffler
An external muffler added further sound/vibration reduction to the machine. It is a specially designed glass-pack muffler. Two styles of mufflers are used. The original muffler used from Series 0 to Series 3 served was a longer muffler. Series 3 machines starting with serial numbers 1899F (30GX), and 1699F (30HX) used a shorter muffler, with the same sound/vibration characteristics.

Compressor Starters
There are two starters for the 30GX/HX machines, Across-the-line and Wye-Delta. The Wye-Delta option is the reduced inrush current option.

Across-the-Line Option
The start option is the standard starting option for all 380-3-60, 460-3-60, 380/415-3-50, and 575-3-60 machines.

Service Bulletins pertaining to this condition:
- SMB020027 – 30GX,HX Compressor Contactor Failures
  This bulletin described the failure mode of the Telemecanique contactors with the binding actuator.
- SMB020027A – 30GX,HX Compressor Contactor Failures
  This bulletin superseded SMB020027. There was no change to the body of the document. The revision clarified the warranty claim procedures.

Wye-Delta Start Option
The preferred method of reduced current starters for the 30GX/HX machines is the Wye-Delta Starter. It is standard starter on all 230-3-60, 208/230-3-60, and 230-3-50 machines. The 30GX/HX machines use an open transition wye-delta starter. The starter consists of 3 contactors: a Shorting Contactor “S”, Run Contactor “1M”, and Delta Contactor “2M”. The contactors “S” and “2M” are mechanically and electrically interlocked, such that they cannot be energized together.

To start the motor, control power to the contactor coils of “S” and “1M” is applied. With these two contactors energized, the motor is connected in a Wye configuration. The motor starts and comes up to operating speed.

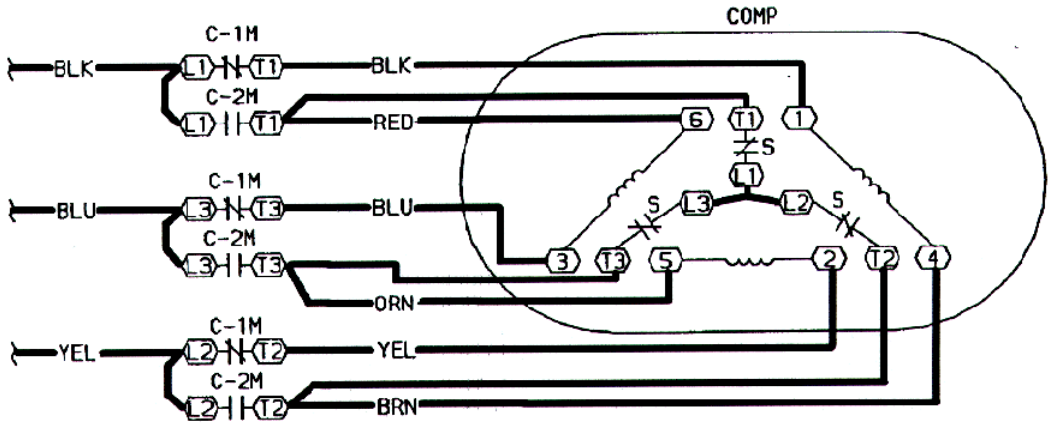

Figure 1 - Wye Start Operation

Approximately five (5) seconds after starting, the “S” contactor is opened. With the change to ComfortLink Compressor Protection Module Revision 26 software, the transition timing changed to 2.5 seconds. The motor is now disconnected from the power supply, yet continues to turn. The motor speed will slow during this transition. The motor should not slow to less than 80% of the operating speed. Within 49 milliseconds, the “2M” contactor is energized. With “1M” and “2M” energized, the motor is configured into a delta configuration.

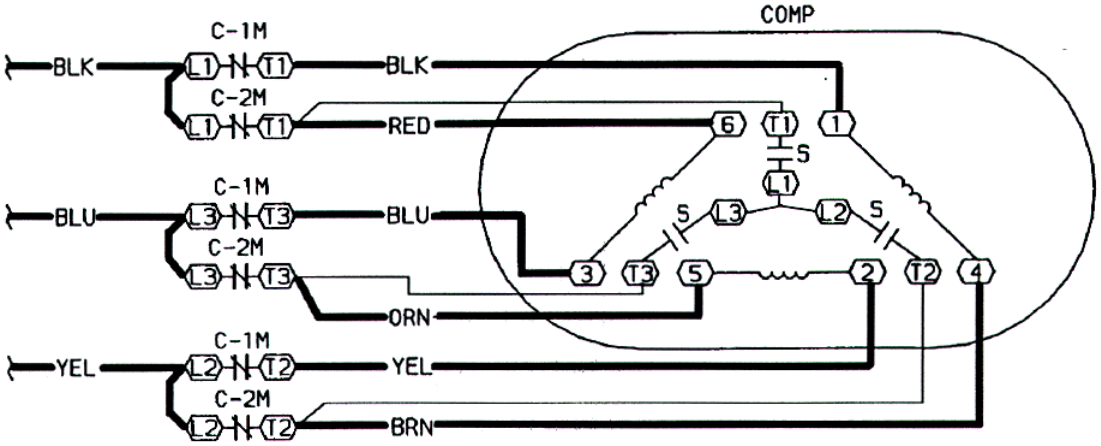

Figure 2 - Delta Operation

Beginning with April 2003 production of the 30GX machines (approximate serial number start 1503F) and October 2002 production of the 30HXA/HXC machines (approximate serial number start 4302Q) the starter manufacturer was changed from Square D/Telemecanique to Siemens. Due to the mechanical interlocks, if a Square D/Telemecanique contactor in the starter fails, it cannot be replaced with a Siemens contactor. Originally, the whole starter must be replaced since the Square D/Telemcanique contactors were unavailable. Beginning January 2004, RCD has set-

up the Square D contactors under RCD part numbers. They are listed below. These parts should be confirmed by inspection and EPIC before placing an order for these parts.

Starter Assembly Part Number	Contactor Part Number	RCD Replacement Part Number (Square D/Telemecanique)
30GX400745	HN53EP115	30GX680010
30GX400746	HN53EP208	30GX680011
30GX400747	HN53EL115	30GX680008
30GX400748	HN53EL208	30GX680009
30GX400749	HN53EK115	30GX680006
30GX400750	HN53EK208	30GX680007
30GX400845	HN53EP209	30GX680012

Service Bulletins pertaining to this condition:

- SMB020027 – 30GX,HX Compressor Contactor Failures
  This bulletin described the failure mode of the Telemecanique contactors with the binding actuator.
- SMB020027A – 30GX,HX Compressor Contactor Failures
  This bulletin superseded SMB020027. There was no change to the body of the document. The revision clarified the warranty claim procedures.

Condenser Fans

The 30GX machines use the “Flying Bird Fan”. This fan is made from a UV stable molded plastic with a brass hub. The fan is secured with set screws and a keyway to the motor shaft.

The fan is molded with a date code. Two styles of date codes were used.

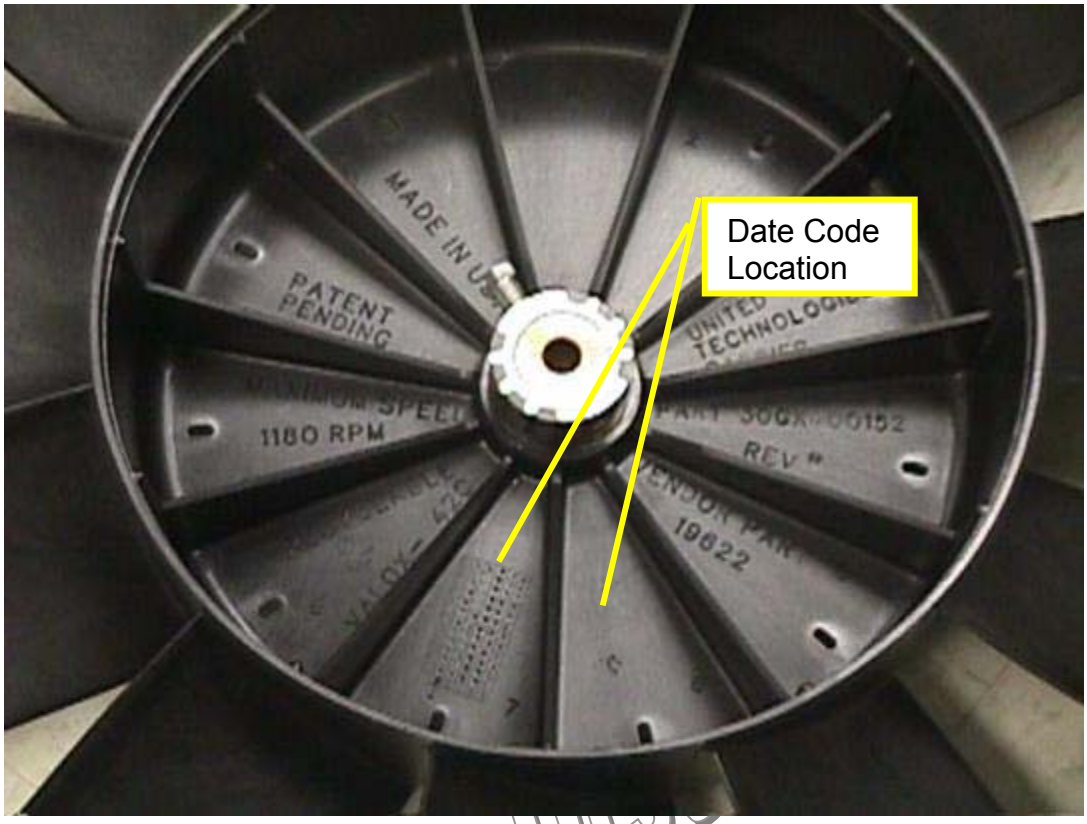

Table 2 - Flying Bird Fan Date Code Locations

Originally, a grid was used denoting a month and year of production. To determine the production date code, find the last ● punched in the grid style date code that will correspond to a month and year.

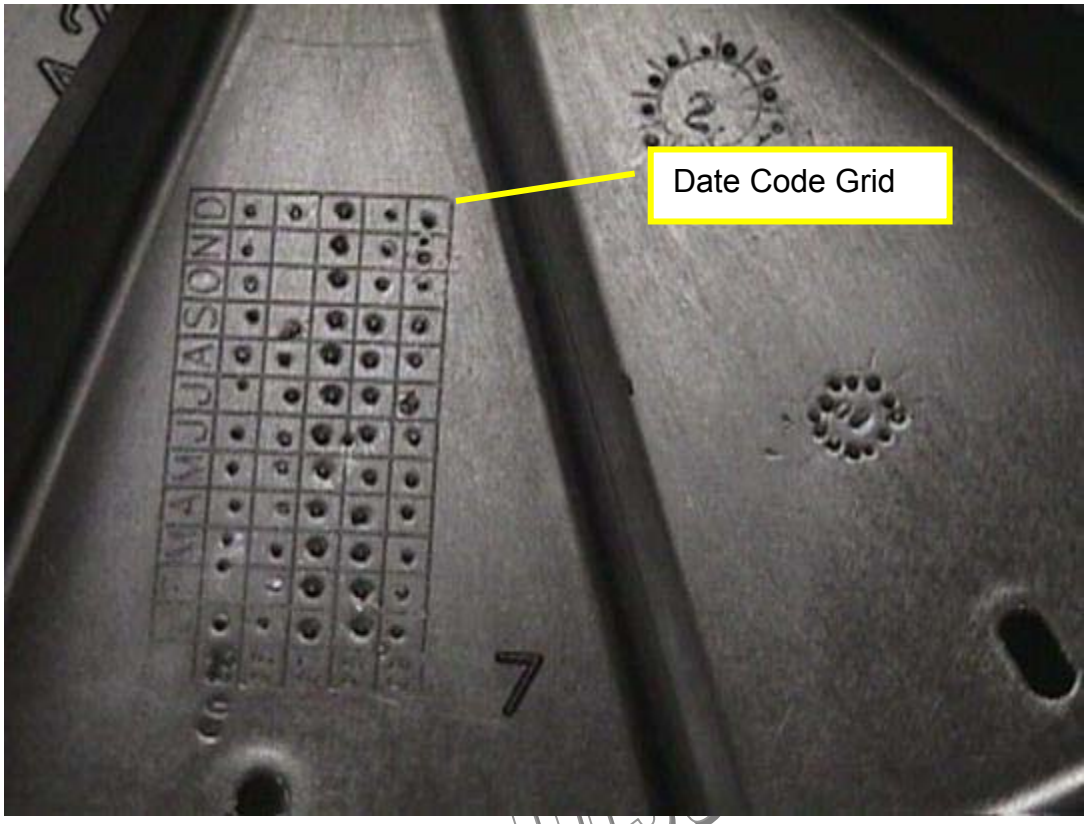

Table 3 - Flying Bird Fan Grid Style Date Code Format

Flying Bird Grid Style Date Code Format and Example

	J	F	M	A	M	J	J	A	S	O	N	D
00	●	●	●	●								
96	●	●	●	●	●	●	●	●	●			●
97	●	●	●	●	●	●	●	●	●	●	●	●
98	●	●	●	●	●	●	●	●	●	●	●	●
99	●	●	●	●	●	●	●	●	●	●	●	●

Note: ● - Indicates a month the mold produced a fan.

In the above example, the fan was produced in April 2000.

At the end of 2000, this grid was filled completely and a date code wheel was added. The wheel has a number in it corresponding to a year. Once the year is completed another wheel is added with the last digits of the year in the center: 1-2001, 2-2002, 3-2003, etc. Each dot around the perimeter represents a month: 1 dot-January, 2 dots-February, 3 dots-March, etc.

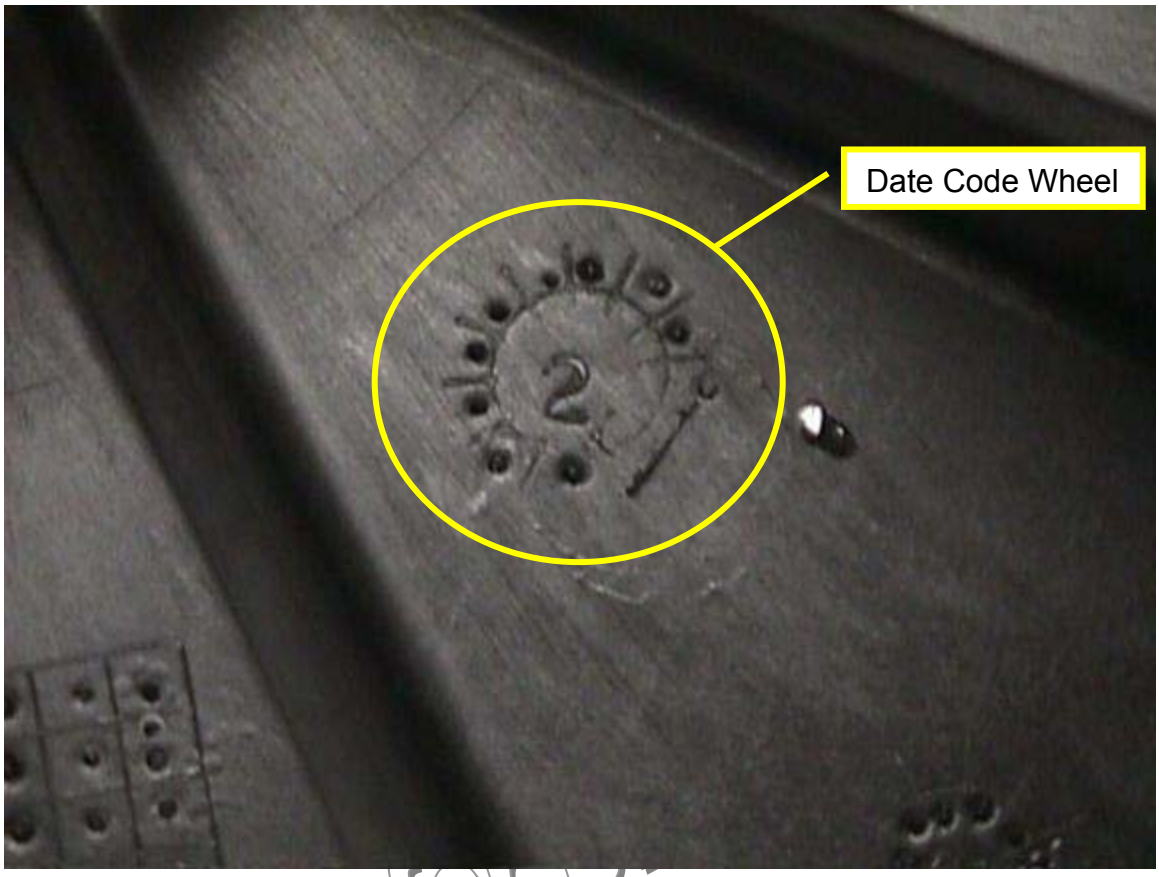

Table 4 - Flying Bird Fan Wheel Style Date Code

In the above picture, this fan was produced in October 2002 (10 dots and a “2” in the center).

Several modifications have been made to the fan. Starting Serial Numbers are approximations of the implementation of the improvement.

Beginning with Serial Number 4299F, the set screw torque was changed from 220 in-lbs. (19.6 N-m) to 160 in-lbs. (14.2 N-m).

In some instances, the set screws would loosen allowing the condenser fan to slide down the motor shaft and ride along the fan orifice. Beginning with serial numbers 0700F, a square head hardened set screw and key were installed rather than an allen socket set screw from the factory to help maintain the correct torque of the set screw to the fan shaft keyway. The torque was changed to 216 in-lbs (19.2 N-m). An RCD Service Kit was set-up with the hardened set screws and keyways. The kit, 30GX660010 contains enough hardware to modify 2 fans.

Starting with serial numbers 3000F, a spacer was installed between the motor and the fan to stop the fan from sliding down the motor shaft. The part can be obtained from

McMaster-Carr, part number 6432K21. This spacer remained in production until the hub improvements noted in 5200F were implemented.

Starting with serial numbers 4200F, additional hub improvements were made. The set screw torque was changed to 240 in-lbs (27.1 N-m).

Beginning with serial numbers 5200F, the hub was redesigned to have pins to better capture the plastic to the hub. A spun-in washer was added to the hub to stop the fan from sliding down the shaft as shown in the figure below.

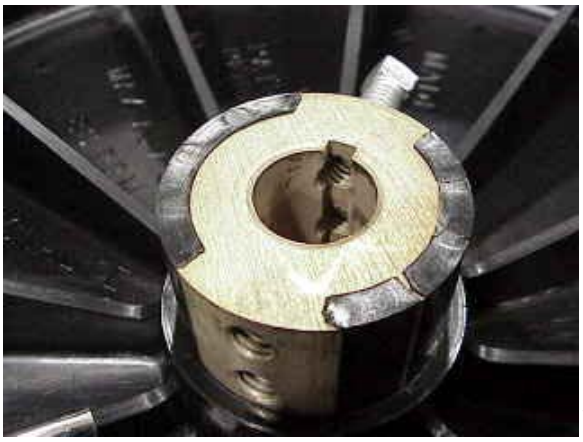

Table 5 - Fan Hub
(Prior Serial Number 5200F)

Table 6 - Fan Hub
(Starting Serial Number 5200F)

Beginning with the May 2001 fan production, (Approximate Serial Number Start, 1901F), two 3/8" holes were drilled into the fan hub to better capture the plastic during the mold process.

The fan cover was redesigned slightly to secure the cover better. Larger drain holes were molded into the fan as shown below. The view shown is from the under side of the fan.

Table 7 - Fan Drain
(Prior Serial Number 5200F)

Table 8 - Fan Drain
(Starting Serial Number 5200F)

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Beginning with Serial Number 4201F, the set screw torque was changed from 160 in-lbs. (14.2 N-m) to 192 in-lbs (17.1 N-m).

Control Modules

Compressor Protection Module (CPM)

This device monitors the high pressure switch, running current, and motor temperature for its compressor. The Compressor Protection Module (CPM) controls the compressor contactors, compressor oil solenoid and motor cooling solenoid. The CPM controls the compressor contactors, compressor oil solenoid and motor cooling solenoid.

During the initialization period of the module, the Must Trip Amp (MTA) value as determined by the Configuration Header is transmitted to the PSIO as a feedback voltage signal. After the initialization period, the feedback voltage signals an alarm condition. A feedback voltage of zero (0), signals a normal operating condition.

HN67LM100 Compressor Protection Module

One module is used to control each compressor. In addition to the points monitored above, the input voltage is also monitored for its compressor. The CPM controls the compressor contactors, compressor oil solenoid and motor cooling solenoid.

Each module is addressed by DIP Switches. The addresses are as follows:

Compressor Protection Module	DIP Switch 1	DIP Switch 2	DIP Switch 3	DIP Switch 4
CPMA1	0	1	0	1
CPMA2	0	1	1	1
CPMB1	1	0	0	1

Several versions of software were installed in the HN67LM100 CPM:

B3309 - Shipped in 30HX-900---025 (SMB980004) upgrade package.
Production: 4497F
- 18% current imbalance
- 20% single phase current loss
- Single-Phase Voltage Alarm removed
- Wye-Delta transition changed from 8 seconds to 5 seconds
- Ground fault trip time to 1 minute

B3544 - Provided in HN67LM100 replacement module available from RCD
- 25% current imbalance
- 30% single phase current loss

- Wye-Delta transition changed from 8 seconds to 5 seconds
- Ground fault trip time to 1 minute

B3549 - Available through RCD – 30GX660015
- Single-Phase Current Loss Alarm removed
- Current Imbalance Alarm removed
- Single phase voltage alarm removed
- Wye-Delta transition changed from 8 seconds to 5 seconds
- Ground fault trip time to 1 minute

B3550 - Available through RCD – 30GX660016
- Voltage Phase Reversal Alarm removed
- 25% current imbalance
- 30% single phase current loss
- Wye-Delta transition changed from 8 seconds to 5 seconds
- Ground fault trip time to 1 minute

B4057 - Available through RCD – AH4004
- Contactor Failure Alarm removed

Current Transformer (Toriod)

The Compressor Protection Modules use current toriods to sense compressor current. There are 3 current transformers per module. The current transformer is mounted n a molded plastic case. A two (2) wire Molex-type connector is used to connect the toroids to the Compressor Protection Module. The toriod resistance is 0.6 Ω.

HN67LM101 and 30GX503191 Compressor Protection Module

Introduction of the Texas Instrument CPMs began with Series 3 machines. One module is used to control two compressors. This device monitors the high pressure switch, running current, and motor temperature for its compressor. The CPM controls the compressor contactors, compressor oil solenoid and motor cooling solenoid.

During the initial power up of the module, the Must Trip Amp values are transmitted to the PSIO. The PSIO stores this value in a table for information purposes only.

There are two modules, a full current (HN67LM101) and a ½ current (30GX503191) module. The full current module is used if the two compressors have a Must Trip Amps (MTA) rating less than 314 amps. If either compressor's MTA is above 314 amps, the ½ current module is used. Production began with the Texas Instrument Compressor Protection Module 0899F (30GX) and 1299F (30HX).

Several versions of software were installed in the HN67LM101 and 30GX503191 CPM. The software label located on the EPROM indicates the software installed. With both CPMs, HN67LM101 and 30GX503191, the software is "100233-1R1 ver.1 rev.x" where "x" is the revision listed below.

Revision 22
- Prone to x.8 (Current Phase Reversal) Alarm if the HPS is open at start-up.
- Prone to chattering High Pressure Switch alarming the machine with x.2 (No Motor Current)

Revision 23
- Prone to x.8 (Current Phase Reversal) Alarm if the HPS is open at start-up.
- Prone to chattering High Pressure Switch alarming the machine with x.2 (No Motor Current)

Revision 26
- Prone to x.8 (Current Phase Reversal) Alarm if the HPS is open at start-up.
- Manufacturing problem with conformal coating of the circuit board that trapped moisture under the coating. This caused many nuisance CPM alarms.
- Prone to chattering High Pressure Switch alarming the machine with x.2 (No Motor Current)

Revision 27
- Not released to production. Special Revision removed the Contactor Failure Alarm to determine the cause of the alarm.
- Prone to x.8 (Current Phase Reversal) Alarm if the HPS is open at start-up.
- Prone to chattering High Pressure Switch alarming the machine with x.2 (No Motor Current)

Revision 28
- Released to production, but recalled and all machines reworked due to a software bug
- Prone to x.8 (Current Phase Reversal) Alarm if the HPS is open at start-up.
- Prone to chattering High Pressure Switch alarming the machine with x.2 (No Motor Current)

Revision 29
- Prone to x.8 (Current Phase Reversal) Alarm if the HPS is open at start-up.
- Prone to chattering High Pressure Switch alarming the machine with x.2 (No Motor Current)

Revision 29A
- Prone to x.8 (Current Phase Reversal) Alarm if the HPS is open at start-up.
- Prone to chattering High Pressure Switch alarming the machine with x.2 (No Motor Current)

Revision 30D
- Prone to x.5 (Ground Fault) Alarm on the ½ current CPM.
- Prone to chattering High Pressure Switch alarming the machine with x.2 (No Motor Current)

Each module is addressed by DIP Switches 3 and 4. The addresses are as follows:

HN67LM101 or 30GX503191

Compressor Protection Module	DIP Switch 3	DIP Switch 4
CPM1	0	0
CPM2	1	1

HN67LM103 and HN67LM104 Compressor Protection Module

With the introduction of ComfortLink to the 30GX/HX products, the CPM was changed to be able to communicate on the LEN bus. The new CPMs, renamed to be ComfortLink Compressor Protection (CCP). The new modules, HN67LM103 (full current) and HN67LM104 (½ current) modules are backward compatible with the HN67LM101 and 30GX503191. The software label located on the EPROM indicates the software installed. The software is "100233-1R3 V1 REV x" where "x" is the revision listed below. In order for a CCP to be used on a non-ComfortLink machine, DIP Switch #1 must be set to "S". RCD has superseded the stock to HN67LM103 and HN67LM104.

Revision 22E

- This EPROM is the original production release of the CCP module.

Revision 23

- This EPROM is the original production release of the CCP module, but since the Local Equipment Network (LEN) could not handle the letter suffixes, the EPROM revision was changed to 23.

Revision 26

- Increased the ground fault trip level from 2.5 +/- 2.0 amps to 4.5 +/- 2.0 amps.
- Changed Wye-Delta transition timer from 5 to 2.5 seconds.
- The time delay for no motor current alarm active was increased from 0.6 to 10 seconds.
- The oil output solenoid is now interlocked through software with the compressor contactor output.

Each module is addressed by DIP Switches 3 and 4. The addresses are as follows:

HN67LM103 or HN67LM104

Compressor Protection Module	DIP Switch 1	DIP Switch 3	DIP Switch 4
CPM1	S	0	0
CPM2	S	1	1

Current Transformer (Toriod)

The Compressor Protection Modules use current toriods to sense compressor current. Both current transformer modules have three (3) toroids in a molded plastic case. A

four (4) wire board connector, one for each toroid and a common, is used to connect the toroids to the Compressor Protection Module.

A current transformer module, 30GX502786 is used to sense the current phase rotation and over current conditions for each compressor. The device consists of 3 toroids, with a resistance of 64.3-70.4 Ω. A 0-15 vac signal is sent from this module, corresponding to a 0 to 900 amp current value.

A new current transformer module was developed for machines with compressor MTA's greater than 314 amps after production stopped. The current transformer module, 30GX504711 is used to sense the current phase rotation and over current conditions for each compressor. The device consists of 3 toroids, with a resistance of 38.5-42 Ω. A 0-15 vac signal is sent from this module, corresponding to a 0 to 900 amp current value. This device requires the HN67LM101 or HN67LM103 Compressor Protection Module to operate properly.

The following table describes the CPM usage and lead configuration.

Unit	Compressor Protection Module		Compressor Lead Configuration			
	CPM1	CPM2	A1	A2	B1	B2
30GX-080---1	HN67LM101	-	A	-	A	-
30GX-080---2	HN67LM101	-	A	-	A	-
30GX-080---5	HN67LM101	-	A	-	A	-
30GX-080---6	HN67LM101	-	A	-	A	-
30GX-080---8	HN67LM101	-	A	-	A	-
30GX-080---9	HN67LM101	-	A	-	A	-
30GX-090---1	HN67LM101	-	A	-	A	-
30GX-090---2	HN67LM101	-	A	-	A	-
30GX-090---5	30GX503191	-	C	-	A	-
30GX-090---6	HN67LM101	-	A	-	A	-
30GX-090---8	HN67LM101	-	B	-	A	-
30GX-090---9	HN67LM101	-	A	-	A	-
30GX-105---8	30GX503191	-	C	-	A	-
30GX-105---9	HN67LM101	-	A	-	A	-
30GX-106---1	HN67LM101	-	A	-	A	-
30GX-106---2	HN67LM101	-	A	-	A	-
30GX-106---5	30GX503191	-	C	-	A	-
30GX-106---6	HN67LM101	-	A	-	A	-
30GX-106---8	30GX503191	-	C	-	A	-
30GX-106---9	HN67LM101	-	A	-	A	-
30GX-115---1	HN67LM101	-	A	-	A	-
30GX-115---2	HN67LM101	-	A	-	A	-
30GX-115---5	30GX503191	-	C	-	B	-

Unit	Compressor Protection Module		Compressor Lead Configuration			
	CPM1	CPM2	A1	A2	B1	B2
30GX-115---6	HN67LM101	-	A	-	A	-
30GX-115---8	30GX503191	-	C	-	A	-
30GX-115---9	HN67LM101	-	A	-	A	-
30GX-125---1	HN67LM101	-	A	-	A	-
30GX-125---2	HN67LM101	-	A	-	A	-
30GX-125---5	30GX503191	-	C	-	B	-
30GX-125---6	HN67LM101	-	A	-	A	-
30GX-125---8	30GX503191	-	C	-	B	-
30GX-125---9	HN67LM101	-	A	-	A	-
30GX-136---1	HN67LM101	-	A	-	A	-
30GX-136---2	HN67LM101	-	A	-	A	-
30GX-136---5	30GX503191	-	C	-	C	-
30GX-136---6	HN67LM101	-	A	-	A	-
30GX-136---8	30GX503191	-	C	-	C	-
30GX-136---9	HN67LM101	-	A	-	A	-
30GX-150---8	30GX503191	-	C	-	C	-
30GX-150---9	HN67LM101	-	A	-	B	-
30GX-151---1	HN67LM101	-	A	-	A	-
30GX-151---2	HN67LM101	-	B	-	A	-
30GX-151---5	30GX503191	-	C	-	C	-
30GX-151---6	HN67LM101	-	A	-	A	-
30GX-160---8	30GX503191	-	C	-	C	-
30GX-160---9	HN67LM101	-	A	-	B	-
30GX-161---1	HN67LM101	-	A	-	A	-
30GX-161---2	HN67LM101	-	B	-	A	-
30GX-161---5	30GX503191	-	C	-	C	-
30GX-161---6	HN67LM101	-	A	-	A	-
30GX-175---8	30GX503191	-	C	-	C	-
30GX-175---9	HN67LM101	-	A	-	A	-
30GX-176---1	HN67LM101	-	A	-	A	-
30GX-176---2	HN67LM101	-	A	-	A	-
30GX-176---5	30GX503191	-	C	-	C	-
30GX-176---6	HN67LM101	-	A	-	A	-
30GX-205---8	30GX503191	HN67LM101	C	A	C	-
30GX-205---9	HN67LM101	HN67LM101	A	A	A	-
30GX-206---1	HN67LM101	HN67LM101	A	A	A	-
30GX-206---2	HN67LM101	HN67LM101	A	A	A	-
30GX-206---5	30GX503191	HN67LM101	C	A	C	-
30GX-206---6	HN67LM101	HN67LM101	A	A	A	-
30GX-225---8	30GX503191	HN67LM101	C	A	C	-
30GX-225---9	HN67LM101	HN67LM101	A	A	A	-
30GX-226---1	HN67LM101	HN67LM101	A	A	A	-

Unit	Compressor Protection Module		Compressor Lead Configuration			
	CPM1	CPM2	A1	A2	B1	B2
30GX-226---2	HN67LM101	HN67LM101	A	A	A	-
30GX-226---5	30GX503191	HN67LM101	C	A	C	-
30GX-226---6	HN67LM101	HN67LM101	A	A	A	-
30GX-250---8	30GX503191	30GX503191	C	C	C	-
30GX-250---9	HN67LM101	HN67LM101	A	A	A	-
30GX-251---1	HN67LM101	HN67LM101	A	A	A	-
30GX-251---2	HN67LM101	HN67LM101	A	A	A	-
30GX-251---5	30GX503191	30GX503191	C	C	C	-
30GX-251---6	HN67LM101	HN67LM101	A	A	A	-
30GX-265---1	HN67LM101	HN67LM101	A	A	A	-
30GX-265---2	HN67LM101	HN67LM101	A	A	A	-
30GX-265---5	30GX503191	30GX503191	C	C	C	-
30GX-265---6	HN67LM101	HN67LM101	A	A	A	-
30GX-265---8	30GX503191	30GX503191	C	C	C	-
30GX-265---9	HN67LM101	HN67LM101	A	A	A	-
30GX-281---1	HN67LM101	HN67LM101	A	A	A	A
30GX-281---2	HN67LM101	HN67LM101	A	A	A	A
30GX-281---6	HN67LM101	HN67LM101	A	A	A	A
30GX-281---9	HN67LM101	HN67LM101	A	A	A	A
30GX-301---1	HN67LM101	HN67LM101	A	A	A	A
30GX-301---2	HN67LM101	HN67LM101	A	A	A	A
30GX-301---6	HN67LM101	HN67LM101	A	A	A	A
30GX-301---9	HN67LM101	HN67LM101	A	A	A	A
30GX-325---1	HN67LM101	HN67LM101	A	A	A	A
30GX-325---2	HN67LM101	HN67LM101	A	A	A	A
30GX-325---6	HN67LM101	HN67LM101	A	A	A	A
30GX-325---9	HN67LM101	HN67LM101	A	A	A	A
30GX-350---1	HN67LM101	HN67LM101	A	A	A	A
30GX-350---2	HN67LM101	HN67LM101	A	A	A	A
30GX-350---6	HN67LM101	HN67LM101	A	A	A	A
30GX-350---9	HN67LM101	HN67LM101	A	A	A	A
30HXA076---1	HN67LM101	-	A	-	A	-
30HXA076---2	HN67LM101	-	A	-	A	-
30HXA076---5	HN67LM101	-	A	-	A	-
30HXA076---6	HN67LM101	-	A	-	A	-
30HXA076---8	HN67LM101	-	A	-	A	-
30HXA076---9	HN67LM101	-	A	-	A	-
30HXA086---1	HN67LM101	-	A	-	A	-
30HXA086---2	HN67LM101	-	A	-	A	-
30HXA086---5	HN67LM101	-	A	-	A	-
30HXA086---6	HN67LM101	-	A	-	A	-
30HXA086---8	HN67LM101	-	A	-	A	-

Unit	Compressor Protection Module		Compressor Lead Configuration			
	CPM1	CPM2	A1	A2	B1	B2
30HXA086---9	HN67LM101	-	A	-	A	-
30HXA096---1	HN67LM101	-	A	-	A	-
30HXA096---2	HN67LM101	-	A	-	A	-
30HXA096---5	30GX503191	-	C	-	A	-
30HXA096---6	HN67LM101	-	A	-	A	-
30HXA096---8	30GX503191	-	C	-	A	-
30HXA096---9	HN67LM101	-	A	-	A	-
30HXA106---1	HN67LM101	-	A	-	A	-
30HXA106---2	HN67LM101	-	A	-	A	-
30HXA106---5	30GX503191	-	C	-	B	-
30HXA106---6	HN67LM101	-	A	-	A	-
30HXA106---8	30GX503191	-	C	-	A	-
30HXA106---9	HN67LM101	-	A	-	A	-
30HXA116---1	HN67LM101	-	A	-	A	-
30HXA116---2	HN67LM101	-	A	-	A	-
30HXA116---5	30GX503191	-	C	-	B	-
30HXA116---6	HN67LM101	-	A	-	A	-
30HXA116---8	30GX503191	-	C	-	A	-
30HXA116---9	HN67LM101	-	A	-	A	-
30HXA126---1	HN67LM101	-	A	-	A	-
30HXA126---2	HN67LM101	-	A	-	A	-
30HXA126---5	30GX503191	-	C	-	C	-
30HXA126---6	HN67LM101	-	A	-	A	-
30HXA126---8	30GX503191	-	C	-	A	-
30HXA126---9	HN67LM101	-	A	-	A	-
30HXA136---1	HN67LM101	-	A	-	A	-
30HXA136---2	HN67LM101	-	A	-	A	-
30HXA136---5	30GX503191	-	C	-	C	-
30HXA136---6	HN67LM101	-	A	-	A	-
30HXA136---8	30GX503191	-	C	-	A	-
30HXA136---9	HN67LM101	-	A	-	A	-
30HXA146---1	HN67LM101	-	A	-	A	-
30HXA146---2	HN67LM101	-	A	-	A	-
30HXA146---5	30GX503191	-	C	-	C	-
30HXA146---6	HN67LM101	-	A	-	A	-
30HXA146---8	30GX503191	-	C	-	C	-
30HXA146---9	HN67LM101	-	A	-	A	-
30HXA161---1	HN67LM101	-	A	-	A	-
30HXA161---2	HN67LM101	-	A	-	A	-
30HXA161---5	30GX503191	-	C	-	B	-
30HXA161---6	HN67LM101	-	A	-	A	-
30HXA161---8	30GX503191	-	C	-	C	-

Unit	Compressor Protection Module		Compressor Lead Configuration			
	CPM1	CPM2	A1	A2	B1	B2
30HXA161---9	HN67LM101	-	A	-	A	-
30HXA171---1	HN67LM101	-	A	-	A	-
30HXA171---2	HN67LM101	-	A	-	A	-
30HXA171---5	30GX503191	-	C	-	C	-
30HXA171---6	HN67LM101	-	A	-	A	-
30HXA171---8	30GX503191	-	C	-	C	-
30HXA171---9	HN67LM101	-	A	-	A	-
30HXA186---1	HN67LM101	-	A	-	A	-
30HXA186---2	HN67LM101	-	A	-	A	-
30HXA186---5	30GX503191	-	C	-	C	-
30HXA186---6	HN67LM101	-	A	-	A	-
30HXA186---8	30GX503191	-	C	-	C	-
30HXA186---9	HN67LM101	-	A	-	A	-
30HXA206---1	HN67LM101	HN67LM101	A	A	A	-
30HXA206---2	HN67LM101	HN67LM101	B	A	B	-
30HXA206---5	30GX503191	HN67LM101	C	B	C	-
30HXA206---6	HN67LM101	HN67LM101	A	A	A	-
30HXA206---8	30GX503191	HN67LM101	C	B	C	-
30HXA206---9	HN67LM101	HN67LM101	B	A	B	-
30HXA246---1	HN67LM101	HN67LM101	A	A	A	-
30HXA246---2	HN67LM101	HN67LM101	B	A	B	-
30HXA246---5	30GX503191	30GX503191	C	C	C	-
30HXA246---6	HN67LM101	HN67LM101	A	A	A	-
30HXA246---8	30GX503191	30GX503191	C	C	C	-
30HXA246---9	HN67LM101	HN67LM101	B	B	B	-
30HXA261---1	HN67LM101	HN67LM101	A	A	A	-
30HXA261---2	HN67LM101	HN67LM101	B	B	B	-
30HXA261---5	30GX503191	30GX503191	C	C	C	-
30HXA261---6	HN67LM101	HN67LM101	A	A	A	-
30HXA261---8	30GX503191	30GX503191	C	C	C	-
30HXA261---9	HN67LM101	HN67LM101	B	B	B	-
30HXA271---1	HN67LM101	HN67LM101	A	A	A	-
30HXA271---2	HN67LM101	HN67LM101	B	B	B	-
30HXA271---5	30GX503191	30GX503191	C	C	C	-
30HXA271---6	HN67LM101	HN67LM101	A	A	A	-
30HXA271---8	30GX503191	30GX503191	C	C	C	-
30HXA271---9	HN67LM101	HN67LM101	B	B	B	-
30HXC076---1	HN67LM101	-	A	-	A	-
30HXC076---2	HN67LM101	-	A	-	A	-
30HXC076---5	HN67LM101	-	A	-	A	-
30HXC076---6	HN67LM101	-	A	-	A	-
30HXC076---8	HN67LM101	-	A	-	A	-

Unit	Compressor Protection Module		Compressor Lead Configuration			
	CPM1	CPM2	A1	A2	B1	B2
30HXC076---9	HN67LM101	-	A	-	A	-
30HXC086---1	HN67LM101	-	A	-	A	-
30HXC086---2	HN67LM101	-	A	-	A	-
30HXC086---5	HN67LM101	-	A	-	A	-
30HXC086---6	HN67LM101	-	A	-	A	-
30HXC086---8	HN67LM101	-	A	-	A	-
30HXC086---9	HN67LM101	-	A	-	A	-
30HXC096---1	HN67LM101	-	A	-	A	-
30HXC096---2	HN67LM101	-	A	-	A	-
30HXC096---5	HN67LM101	-	A	-	A	-
30HXC096---6	HN67LM101	-	A	-	A	-
30HXC096---8	HN67LM101	-	A	-	A	-
30HXC096---9	HN67LM101	-	A	-	A	-
30HXC106---1	HN67LM101	-	A	-	A	-
30HXC106---2	HN67LM101	-	A	-	A	-
30HXC106---5	HN67LM101	-	A	-	A	-
30HXC106---6	HN67LM101	-	A	-	A	-
30HXC106---8	HN67LM101	-	A	-	A	-
30HXC106---9	HN67LM101	-	A	-	A	-
30HXC116---1	HN67LM101	-	A	-	A	-
30HXC116---2	HN67LM101	-	A	-	A	-
30HXC116---5	HN67LM101	-	A	-	A	-
30HXC116---6	HN67LM101	-	A	-	A	-
30HXC116---8	HN67LM101	-	A	-	A	-
30HXC116---9	HN67LM101	-	A	-	A	-
30HXC126---1	HN67LM101	-	A	-	A	-
30HXC126---2	HN67LM101	-	A	-	A	-
30HXC126---5	HN67LM101	-	B	-	B	-
30HXC126---6	HN67LM101	-	A	-	A	-
30HXC126---8	HN67LM101	-	A	-	A	-
30HXC126---9	HN67LM101	-	A	-	A	-
30HXC136---1	HN67LM101	-	A	-	A	-
30HXC136---2	HN67LM101	-	A	-	A	-
30HXC136---5	30GX503191	-	C	-	B	-
30HXC136---6	HN67LM101	-	A	-	A	-
30HXC136---8	30GX503191	-	C	-	A	-
30HXC136---9	HN67LM101	-	A	-	A	-
30HXC146---1	HN67LM101	-	A	-	A	-
30HXC146---2	HN67LM101	-	A	-	A	-
30HXC146---5	30GX503191	-	C	-	B	-
30HXC146---6	HN67LM101	-	A	-	A	-
30HXC146---8	30GX503191	-	C	-	A	-

Unit	Compressor Protection Module		Compressor Lead Configuration			
	CPM1	CPM2	A1	A2	B1	B2
30HXC146---9	HN67LM101	-	A	-	A	-
30HXC161---1	HN67LM101	-	A	-	A	-
30HXC161---2	HN67LM101	-	A	-	A	-
30HXC161---5	30GX503191	-	C	-	B	-
30HXC161---6	HN67LM101	-	A	-	A	-
30HXC161---8	30GX503191	-	C	-	A	-
30HXC161---9	HN67LM101	-	A	-	A	-
30HXC171---1	HN67LM101	-	A	-	A	-
30HXC171---2	HN67LM101	-	A	-	A	-
30HXC171---5	30GX503191	-	A	-	C	-
30HXC171---6	HN67LM101	-	A	-	A	-
30HXC171---8	30GX503191	-	A	-	C	-
30HXC171---9	HN67LM101	-	A	-	A	-
30HXC186---1	HN67LM101	-	A	-	A	-
30HXC186---2	HN67LM101	-	A	-	A	-
30HXC186---5	30GX503191	-	C	-	C	-
30HXC186---6	HN67LM101	-	A	-	A	-
30HXC186---8	30GX503191	-	C	-	C	-
30HXC186---9	HN67LM101	-	A	-	A	-
30HXC206---1	HN67LM101	HN67LM101	A	A	A	-
30HXC206---2	HN67LM101	HN67LM101	A	A	A	-
30HXC206---5	30GX503191	HN67LM101	B	A	C	-
30HXC206---6	HN67LM101	HN67LM101	A	A	A	-
30HXC206---8	30GX503191	HN67LM101	B	A	C	-
30HXC206---9	HN67LM101	HN67LM101	A	A	A	-
30HXC246---1	HN67LM101	HN67LM101	A	A	A	-
30HXC246---2	HN67LM101	HN67LM101	A	A	A	-
30HXC246---5	30GX503191	HN67LM101	C	B	C	-
30HXC246---6	HN67LM101	HN67LM101	A	A	A	-
30HXC246---8	30GX503191	HN67LM101	C	B	C	-
30HXC246---9	HN67LM101	HN67LM101	A	A	A	-
30HXC261---1	HN67LM101	HN67LM101	A	A	A	-
30HXC261---2	HN67LM101	HN67LM101	A	A	A	-
30HXC261---5	30GX503191	HN67LM101	C	B	C	-
30HXC261---6	HN67LM101	HN67LM101	A	A	A	-
30HXC261---8	30GX503191	HN67LM101	C	B	C	-
30HXC261---9	HN67LM101	HN67LM101	A	A	A	-
30HXC271---1	HN67LM101	HN67LM101	A	A	A	-
30HXC271---2	HN67LM101	HN67LM101	A	A	A	-
30HXC271---5	30GX503191	30GX503191	C	C	C	-
30HXC271---6	HN67LM101	HN67LM101	A	A	A	-
30HXC271---8	30GX503191	30GX503191	C	C	C	-

Unit	Compressor Protection Module		Compressor Lead Configuration			
	CPM1	CPM2	A1	A2	B1	B2
30HXC271---9	HN67LM101	HN67LM101	A	A	A	-

Configuration A: 1 set of leads, all through the toroid. See Table 9.
Configuration B: 2 sets of leads, all through the toroid. See Table 10.
Configuration C: 2 sets of leads, 1 set through the toroid, the other around it. See Table 11.

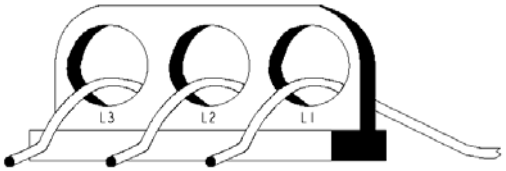

Table 9 - Configuration A

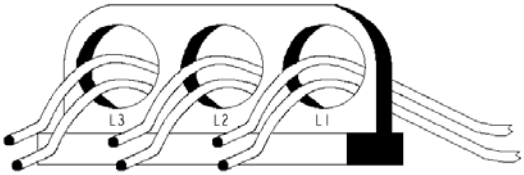

Table 10 - Configuration B

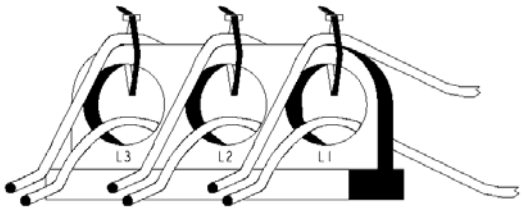

Table 11 - Configuration C

HSIO
This device consists of a keypad with 8 function keys, 4 operative keys, 12 numeric keys, and a 2-line 24-character alphanumeric LCD (liquid crystal display).

Troubleshooting:

Display reads “Carrier Comfort Network”
This is a normal display when powering up the module. If the message remains, check the following items:

- Check for a valid program in PSIO1. If the program is lost in the PSIO1, the default display will remain on the HSIO.
- Check the COMM3 wiring between the PSIO1 and HSIO. A problem with the RCD replacement cable manufacturing would lead to the same problem.

Service Bulletins pertaining to this issue:

- SMB980077 – HSIO-II Data Cable Connection
  This bulletin describes the possibility of incorrect connection cables on replacement HSIO modules from RCD. The correct wiring is shown in the bulletin.

DSIO-EXV

The electronic expansion device module has 4 inputs and 2 outputs. It receives signals from the PSIO-1 module and operates the electronic expansion devices. The electronic expansion device module also sends the PSIO-1 module the status of its 4 input channels.

Rotary switches on the bottom of the device address the module. The device is 50. The rear switch should be set for 5, the front switch set for 0.

The DSIO-EXV module performs continuous diagnostic evaluations of the condition of the hardware. Proper operation of this module is indicated by LEDs on the front surface of the DSIO-EXV.

RED LED — Blinking continuously at a 1 to 2 second rate indicates proper operation. Lighted continuously indicates a problem requiring replacement of module. Off continuously indicates power should be checked. If there is no input power, check fuses. If fuse is bad, check for shorted secondary of transformer, tripped circuit breaker or bad module. On the PSIO module, if the light is blinking at a rate of twice per second, the module should be replaced.
GREEN LED —Green LED should always be blinking when power is on. It indicates the module is communicating properly. If green LED is not blinking, check red LED. If red LED is normal, check module address
switches.

If *all* modules indicate communication failure, check COMM plug on PSIO-1 module for proper seating. If a good connection is assured and condition persists, replace PSIO-1 module.

If the DSIO-EXV module indicates communication failure, check COMM plug on the module for proper seating. Check for the following resistances in the COMM3 plug. Remove proper and COMM wiring before attempting the resistance readings.

	Resistance (ohms)				
	COMM3-1	COMM3-2	COMM3-3	COMM3-4	Ground
COMM3-1	-				14,400
COMM3-2		-		0	0
COMM3-3			-		14,400
COMM3-4		0		-	0

If a good connection is assured and the condition persists, replace the DSIO-EXV module.

All system operating intelligence rests in the PSIO-1 module, the module that controls unit. This module monitors conditions through input and output ports and through DSIO modules (high-voltage relay module and EXV driver module). The machine operator communicates with microprocessor through keypad and display module. A 3-wire sensor bus accomplishes communication between PSIO and other modules. These 3 wires run in parallel from module to module. On sensor bus terminal strips, terminal 1 of PSIO module is connected to terminal 1 of each of the other modules. Terminals 2 and 3 are connected in the same manner. If a terminal 2 wire is connected to terminal 1, system does not work.

A separate 12.5 vdc power source is used for the DSIO-EXV module through terminals 1 and 2 on the power connector.

PSIO1
The PSIO1 is the control module with the software program loaded.

There are 2 sets of part numbers for the PSIO1 depending on the series of the machine. Before ordering these parts, confirm the part numbers with EPIC.

Unit	Series	PSIO1 Part Number
30GX080-150, 160	0, 1 and 2	30GX502176
30GX080-150, 160	3	30GX502892
30GX151, 161, 175	0, 1 and 2	30GX502177
30GX151, 161, 175	3	30GX502891
30GX176	0, 1 and 2	30GX502179
30GX176	3	30GX502890
30GX205-265	3	30GX502182
30GX205-265	3	30GX502842
30GX281-350	3	30GX503172
30HXA/HXC076-186	0	30HX500802
30HXA/HXC076-186	3	30HX501216
30HXA/HXC206-271	0	30HX500807
30HXA/HXC206-271	3	30HX501215

Once installed, the PSIO1 module will need to be configured for the correct machine. The configuration codes must be verified, and corrected as needed. Installing the incorrect module in the machine will result in erratic operation due to channel configuration differences.

Service Bulletins pertaining to the condition:
- SMB980024 – PIC Replacement Modules

This bulletin listed the replacement part numbers for the PSIO1 module.

- SMB990019 – 30GX/HX CPM and Oil Pump Changes
  This bulletin introduced the mag-drive oil pumps and Texas Instruments Compressor Protection Modules. With these changes came new PSIO1 part numbers due to channel configuration changes.
- SMB000026 – 30GX/HX Software Revisions
  This bulletin described the software revisions from Version 4 to Version 15. A more complete listing of PSIO1 modules was listed in this bulletin.

The PSIO1 is an 8088 hardened module, HK50AA023. The operational software is stored in RAM (Random Accessed Memory). For this reason a battery is required to maintain power and retain the software in the memory. If the battery fails, the HSIO will display “Carrier Comfort Network” and the keypad is inoperable.

A 3.6 volt AA Lithium battery Part Number CECO120803-01 is required for this module. The nominal voltage is 3.6-3.7 volts which is maintained throughout most of its life. The power circuitry is designed such that the battery is always in the circuit. The battery life will diminish faster if the module is not powered. It also depends on the steady state voltage of the unit and the ambient temperature of the module.

The life expectancy of the lithium battery is around four (4) years. Voltage drops rapidly when the battery is near the end of its life. The following guideline should be used for good maintenance.

1. As part of the yearly maintenance schedule, check the voltage level of the battery for the PSIO1. If the battery voltage reads 3.5 volts or less, the battery is approaching the end of its useful life and should be changed. The voltage should be measured with the battery in place inside the module. With the control power on, check the voltage by placing one test lead on each pole of the battery.
2. As part of the unit scheduled maintenance, replace the battery every four years regardless of the voltage reading.

CAUTION: Power must be applied to the module when the battery is replaced or the loss of the software will occur.

Service Bulletins pertaining to the condition:

- ADV97014 – Battery Replacement
  This bulletin described the test procedure, recommended guidelines and battery part number.

PSIO2

The PSIO2 is an Input/Output module. There is no software loaded in this module. This module is an HK50AA001 module.

If Loss of Communication Alarms persist with devices connected to this module, consider replacing this module with a blank HK50AA023. The address must be set

properly. There cannot be a software program loaded in this module, or erratic operation will occur.

Cooler Liquid Level Sensor

This device provides the control system with an operating level of liquid refrigerant in the cooler. The device uses an 18-watt heater to heat three (3) 5 kΩ @ 77 °F (25 °C) thermistors wired in series. The thermostat is set to maintain the device at 110 ºF ± 2.8 ºF (43.3 ºC ± 5.0 ºC).

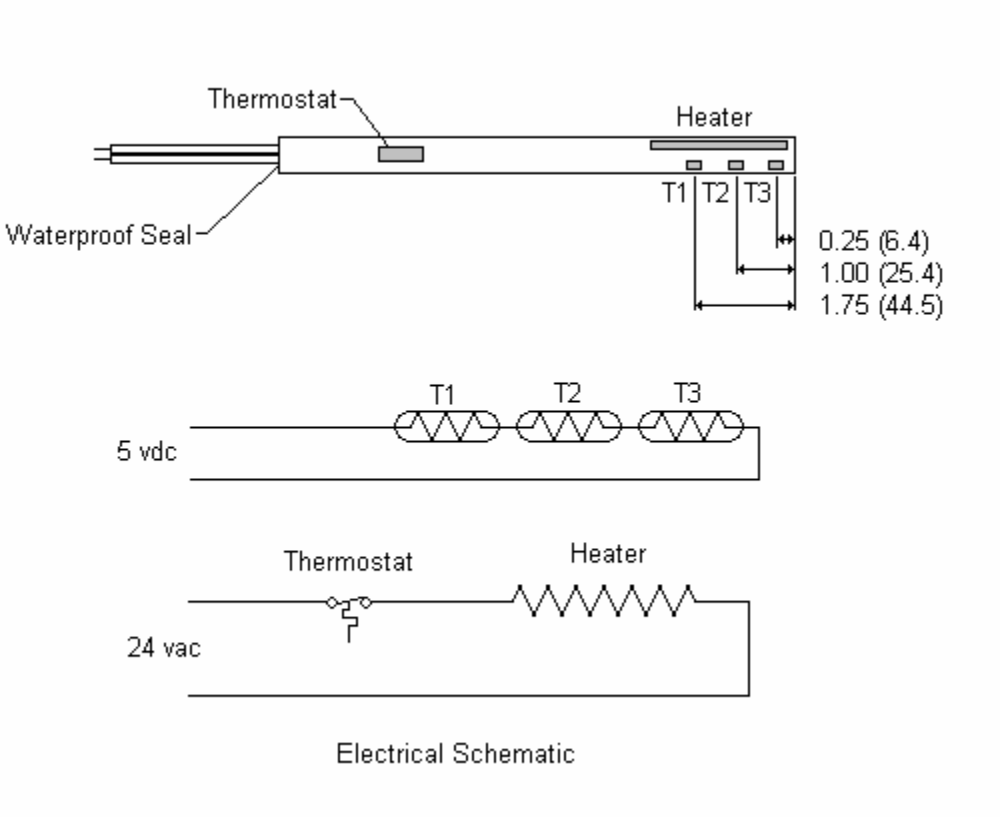

Figure 3 - Cooler Liquid Level Sensor

Troubleshooting:

To check the Cooler Liquid Level Sensor's heater, disconnect the Cooler Liquid Level Sensor from the control system, disabling the internal heater. Measure the heater's resistance. The resistance should be 31.4 Ω.

To check the thermistors, disconnect the Cooler Liquid Level Sensor from the control system, disabling the internal heater. Allow the sensor to come to equilibrium with the cooler. Measure the resistance of the three thermistors. With a refrigerant gage, measure the cooler pressure and convert the pressure to a saturated temperature. On a 5 kΩ thermistor chart, find the resistance corresponding to the saturated temperature

and multiply the resistance by 3. The multiplied value should be close to the measured resistance.

Replacement:

CAUTION

Liquid level sensors are installed in the top of the cooler using compression fittings and are under refrigerant pressure. The refrigerant pressure in the cooler must be relieved using appropriate means prior to replacing the liquid level sensor.

Transfer refrigerant and recover any refrigerant remaining in the low side.

NOTE: A new packing nut and ferrule will be required as the old one is not removable from the old thermistor. RCD currently supercedes all liquid level sensors to 30GX660002 that contains the packing nut, ferrule, liquid level sensor, and plug assembly.

For Series 0 and 1 units, the liquid level sensor was spliced to wires connected directly in the control box. The 30GX660002 kit has a plug assembly on the end of the liquid level sensor. The plug could be removed, however, there is not much wire remaining and may be difficult to splice. It is recommended that the wiring harness, 30GX401980 be used in conjunction with the 30GX660002 kits. This will provide the required plug for the 30GX660002 level sensor.

Remove the wiring from the defective level sensor. Loosen the packing nut fully from the well threads. Remove and discard old thermistor and packing nut. Slide new packing nut then ferrule up onto new thermistor probe from inserted end. Insertion depth is dependent on unit model number. See Figure 5. Hand tighten packing nut to position ferrule while holding thermistor in position. With wrench, tighten enough to firmly secure thermistor in place in well. Connect new harness 30GX501980 to the level sensor and run the remaining harness into main control box. Connect black and red wires of the harness to PSIO1-J7-5 and PSIO1-J7–6 for T3, PSIO1-J7-8 and PSIO1-J7–9 for T4 for thermistor readings. Connect the green and red wires of the harness to the red and brown wires that previously connected to TRAN-7.

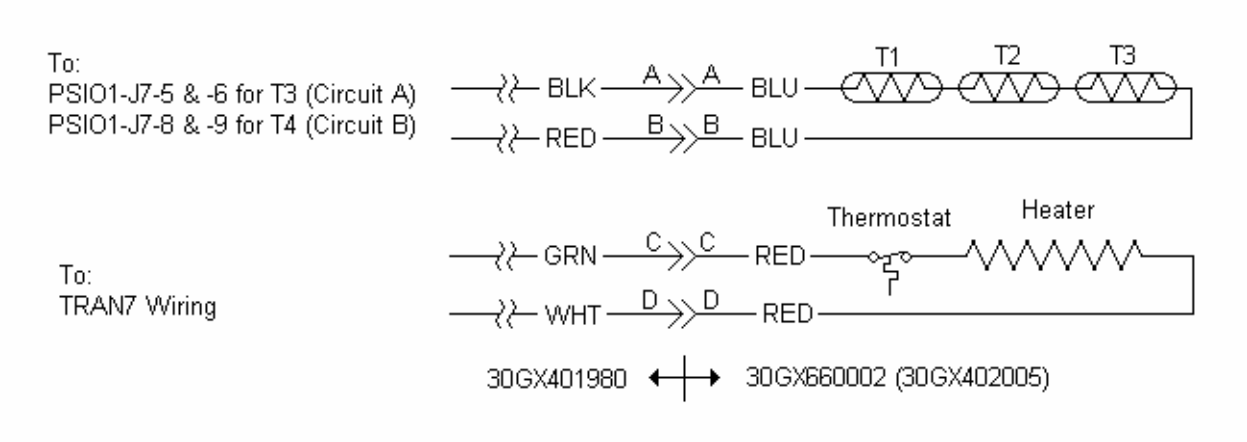

Figure 4 - Liquid Level Sensor Plug Wiring

Restore unit control power only and verify that level thermistor is reading correctly. Check system low side for leaks and repair as necessary. Evacuate low side and open circuit discharge and liquid valves.

For Series 2 and 3 units, disconnect plug assembly at liquid level sensor. Loosen the packing nut fully from the well threads. Remove and discard old thermistor and packing nut. Slide new packing nut then ferrule up onto new thermistor probe from inserted end. Insertion depth is dependent on unit model number. See Figure 5. Hand tighten packing nut to position ferrule while holding thermistor in position. With wrench, tighten enough to firmly secure thermistor in place in well. Reconnect plug assembly to new liquid level sensor. Restore unit control power only and verify that level thermistor is reading correctly. Check system low side for leaks and repair as necessary. Evacuate low side and open circuit discharge and liquid valves.

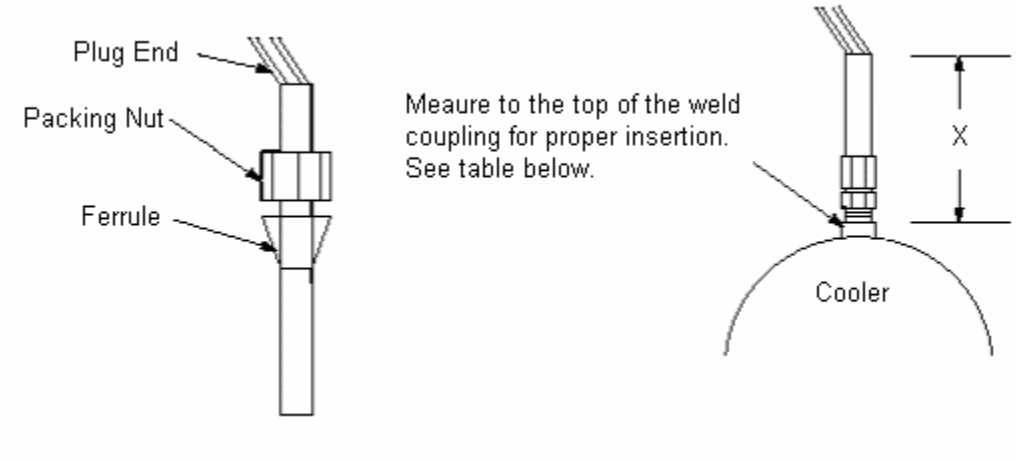

Figure 5 - Liquid Level Sensor Insertion

30GX	"X" Depth, in. (mm)	30HXA/HXC	"X" Depth, in. (mm)
080-090	6.00 (152.4)	076-086	5.13 (130.3)
105-115	4.25 (108.0)	096	6.00 (152.4)
125-136	5.56 (141.2)	106	4.25 (108.0)
150, 151	6.00 (152.4)	116-126	5.13 (130.3)
160, 161	4.25 (108.0)	136-146	6.00 (152.4)
175, 176	4.25 (108.0)	161-171	4.25 (108.0)
205-226	3.94 (100.0)	186	5.56 (141.2)
250-265	4.82 (122.4)	206	3.94 (100.0)
281-350	5.00 (127.0)	246-271	4.82 (122.4)

Expansion Device
There are two types of expansion devices that are used across the product line, an Electronic Expansion Valve or an Economizer.

Electronic Expansion Valve
The Electronic Expansion Valve or EXV is used on the 30GX080-106, 30HXA,HXC076-146. The EXV is a 1500 step, non-bottom seal valve.

In 2002, Mueller Industries discontinued the cast body EXV style. The EXV-II style is the replacement. There are different part numbers for the new style valves.

Usage	EXV Part Number	EXV-II Part Number
30HX	32GB401124	32GB402674
	32GB401134	32GB402684
	32GB401144	32GB402694
	32GB401154	32GB402704
	32GB401324	32GB402714
	32GB401334	32GB402724
	32GB401344	32GB402734
	32GB401624	32GB402744
	32GB401634	32GB402754
	32GB401644	32GB402764
30GX	32GB401214	32GB402374
	32GB401224	32GB402384
	32GB401234	32GB402394
	32GB401244	32GB402404
	32GB401254	32GB402414
	32GB401264	32GB402424
30HX	32GB402184	32GB402434
	32GB402194	32GB402444
	32GB402204	32GB402454
	32GB402214	32GB402464
	32GB402224	32GB402474
	32GB402234	32GB402484
	32GB402244	32GB402494
	32GB402254	32GB402504
	32GB402264	32GB402514
	32GB402274	32GB402524

Economizer

The Economizer is a 2-stage expansion device with an Electronic Expansion Valve and low side float. This device is used on the 30GX105-350, 30HXA/HXC161-271. In these machines, the Bubbler Tube connection is a Swagelol connection.

The table below is a reference chart for Economizers. Confirm the part number in EPIC before ordering.

Unit	Standard		Brine	
	Circuit A	Circuit B	Circuit A	Circuit B
30GX-125	32GB401204	32GB401184	32GB401194	32GB401864

Below is a table showing the EXD and Float Orifice details. These dimensions are for reference only.

Carrier Part Number	EXD Orifice					Float Stand			
	Assembly P/N (ref.)	Qty	Slot Width ± 0.001	Slot Height ± 0.001	Stamp No.	Assembly P/N (ref.)	Qty	Slot Width ± 0.001	Slot Height ± 0.001
32GB401094	32GB401494	6	0.078	0.75	804	32GB401444	5	0.118	0.866
32GB401104	32GB401504	9	0.078	0.75	824	32GB401444	5	0.118	0.866
32GB401114	32GB401504	9	0.078	0.75	824	32GB401444	5	0.118	0.866
32GB401174	32GB401494	6	0.078	0.75	804	32GB401444	5	0.118	0.866
32GB401184	32GB401684	5	0.047	0.75	764	32GB401444	5	0.118	0.866
32GB401194	32GB401514	6	0.047	0.75	774	32GB401444	5	0.118	0.866
32GB401204	32GB401524	8	0.047	0.75	794	32GB401444	5	0.118	0.866
32GB401354	32GB401514	6	0.047	0.75	774	32GB401444	5	0.118	0.866
32GB401364	32GB401524	8	0.047	0.75	794	32GB401444	5	0.118	0.866
32GB401374	32GB401494	6	0.078	0.75	804	32GB401444	5	0.118	0.866
32GB401384	32GB401734	10	0.078	0.75	834	32GB401724	8	0.177	1.02
32GB401394	32GB401744	12	0.078	0.75	844	32GB401724	8	0.177	1.02
32GB401404	32GB401754	15	0.078	0.75	854	32GB401724	8	0.177	1.02
32GB401414	32GB401764	7	0.078	0.75	864	32GB401724	8	0.177	1.02
32GB401424	32GB401794	9	0.078	0.75	824	32GB401724	8	0.177	1.02
32GB401654	32GB401684	5	0.047	0.75	764	32GB401444	5	0.118	0.866
32GB401664	32GB401784	4	0.078	0.75	874	32GB401444	5	0.118	0.866
32GB401674	32GB401784	4	0.078	0.75	874	32GB401444	5	0.118	0.866
32GB401804	32GB401764	7	0.078	0.75	864	32GB401724	8	0.177	1.02
32GB401814	32GB401794	9	0.078	0.75	824	32GB401724	8	0.177	1.02
32GB401824	32GB401734	10	0.078	0.75	834	32GB401724	8	0.177	1.02
32GB401834	32GB401744	12	0.078	0.75	844	32GB401724	8	0.177	1.02
32GB401844	32GB401494	6	0.078	0.75	804	32GB401444	5	0.118	0.866
32GB401854	32GB401524	8	0.047	0.75	794	32GB401444	5	0.118	0.866
32GB401864	32GB401694	4	0.047	0.75	754	32GB401444	5	0.118	0.866
32GB401874	32GB401784	4	0.078	0.75	874	32GB401444	5	0.118	0.866
32GB401884	32GB401514	6	0.047	0.75	774	32GB401444	5	0.118	0.866
32GB401894	32GB401784	4	0.078	0.75	874	32GB401444	5	0.118	0.866
32GB401904	32GB401934	8	0.047	0.75	794	32GB401724	8	0.177	1.02
32GB401914	32GB401944	6	0.078	0.75	804	32GB401724	8	0.177	1.02
32GB401924	32GB401954	8	0.078	0.75	894	32GB401724	8	0.177	1.02
32GB402284	32GB401794	9	0.078	0.75	824	32GB401724	8	0.177	1.02
32GB402294	32GB401794	9	0.078	0.75	824	32GB401724	8	0.177	1.02
32GB402304	32GB401944	6	0.078	0.75	804	32GB401724	8	0.177	1.02
32GB402314	32GB401944	6	0.078	0.75	804	32GB401724	8	0.177	1.02
32GB402324	32GB401744	12	0.078	0.75	844	32GB401724	8	0.177	1.02
32GB402334	32GB401744	12	0.078	0.75	844	32GB401724	8	0.177	1.02
32GB402344	32GB401954	8	0.078	0.75	894	32GB401724	8	0.177	1.02
32GB402354	32GB401954	8	0.078	0.75	894	32GB401724	8	0.177	1.02

EXV/Economizer Cable

The same cable to drive the EXV motor is used for the Economizer EXD.

The field made several reports of corroded and shorted Economizer Cables. As a result, a new style Economizer Cable was introduced. No change in the part number was made. The new cable started into production starting with Serial Number 1999F.

Service Bulletins pertaining to this issue:

- SMB990026 – 30 Series EXV/Economizer Cables
  This bulletin was superseded by SMB990026A.
- SMB990026A – 30 Series EXV/Economizer Cables
  This bulletin was superseded by SMB990026B.
- SMB990026B – 30 Series EXV/Economizer Cables
  This bulletin advised the new part number for the EXV cable. The bulletin incorrectly provided the EXV Cable part number. The correct number is 32GB660010.

Head Pressure Control

30GX

MotorMaster III

ComfortLink machines were introduced with MotorMaster III as the device of choice for head pressure control for these machines.

In January 2004, the vendor for the MotorMaster III discontinued production. It was later re-instated by the vendor. See below for additional information. As a result of the original discontinuation, RCD procured another device to replace the MotorMaster III. This device is larger than the original MotorMaster III and as a result must be mounted on the outside of the control box. There are 2 devices available, based on voltage.

Voltage	RCD Part Number	Horsepower Range
240-3-60	P251-0096	1-3
480-3-60	P251-0097	1-5

This device can be controlled via a thermistor, pressure transducer, 4-20 mA or 0-10 vdc signal.

Bulletins pertaining to this issue:

- PMB04-013 – Three Phase Motor Head Pressure Controllers
  This bulletin announced the MotorMaster III discontinuation and that RCD has superceded the MotorMaster to the P251-0096 and P251-0097.

In June 2004, RCD began stocking the original Motormaster III under the part number 32LT660006.

Liquid Line Strainers

30GX080-176 produced prior to 0899F, 30HXA076-186 and 30HXC076-271 produced prior to 1299F, all used in-line liquid line strainers. 30GX080-176 produced starting with serial numbers 0899F, 30HXA076-186 and 30HXC076-271 produced starting with serial numbers 1299F, used the cleanable liquid line strainers.

The 30GX-205-350 and the 30HXA206-271 all used the cleanable liquid line strainers since their introduction.

On 30HXA/HXC076-146 machines produced before 5200F, the strainer frequently filled a small area of the screen with debris causing a restriction of refrigerant flow. This can result in low saturated suction temperature alarms. A factory investigation found insufficient space between the strainer body and screen for annular refrigerant flow. As a result of the low clearance space, all of the refrigerant flow exited the screen through one spot. An early attempt to increase the flow area was made by dimpling the screen. This requires that the screen be properly installed with the dimple at the exit of the strainer body.

As a result, beginning with machines produced with serial number 5200F, the factory began using a new strainer assembly with improved flow characteristics without a part number change. The part number remained KH12HN210. The new part has the same connection points. The only indication of the new strainer is the vendor part number, S-4211 Rev. D, and the machine serial number cut-off. The new screen cannot be installed in the old strainer. RCD continued to stock the old replacement screen and gasket assembly, 3-010-310 until the stock is depleted. Additionally, RCD will offer the new screen and gasket assembly replacement for this new strainer assembly. The part number is 3-010-312 and includes the gasket. If the old screen is restricted and cannot be cleaned, replace the screen. Once the screen assemblies are depleted, it will be necessary to replace the entire strainer assembly with the new design.

Replacement Strainer and Gasket Kits have been set-up in RCD. Confirm these part numbers on EPIC before ordering the parts:

Strainer Assembly Part Number	Screen and Gasket Part Number
KH12HN200	3-010-311
KH12HN210 (Henry P/N: S-4211 Rev. C.)	3-010-310
KH12HN210 (Henry P/N: S-4211 Rev. D.)	3-010-312
KH12HN240	3-010-311
KH12HN280	3-010-311

Service Bulletins pertaining to the condition:

- SMB000015 – 30GX/HX Refrigerant Strainers
  This bulletin announced the use of cleanable strainers in the 30GX/HX line and listed the replacement screen and gasket part number.
- SMB010012 – 30HXA/HXC076-146 Liquid Line Strainer Change
  This bulletin announced a design change to cleanable strainers in the 30HXA/HXC076-146 machines line and listed the replacement screen and gasket part number for the new style.

Oil

Only Carrier-approved POE oil may be used in Carlyle 06N compressors. The only approved oil listed under Carrier Material Specification PP47-32 is Castrol Icematic SW220. It can be obtained from RCD under the following part numbers:

Quantity	Totaline Part Number	RCD Part Number
1 quart	P903-1225	-
1 gallon	P903-1201	PP23BZ104-001
5 gallons	P903-1205	PP23BZ104-005
55 gallons	-	PP23BZ104-055

RCD was selling under the Totaline brand name as "Screw Compressor Oil." This oil was less viscous SW68, than the SW220 called out above, and should not be used in the 30GX/HX machines. Be sure to use only Carrier approved oils in these machines.

Since POE oils have an affinity for water, open containers of oil should not be used when recharging or adding oil to the system. Water and heat can reverse the manufacturing process that creates the oil. A by-product of the break down is acid. As a result, three criteria can be used to check the acceptability of the oil. They are: Total Acid Number (TAN), Moisture Content, and Viscosity. The table below shows what Carrier requires for new POE oil, as well as the acceptable limits Carlyle has placed on the oil in an operational system.

The original bulletin, SMB990028, stated a moisture upper limit of 500 ppm. SMB000056 reduced the moisture level to 100 ppm.

Criteria	Specification Requirement*	Acceptable Limit
Total Acid Number (TAN)	0.10 mg KOH/g	≤0.35 mg KOH/g
Moisture	50 ppm	≤100 ppm
Viscosity @ 40 °C	198-242 cSt	198 cSt<Sample Viscosity< 242 cSt

Note: * - The specification requirement refers to the acceptability criteria for new oil based on Carrier Material Specification PP47-32.

Caution must be exercised in preparing an oil sample for testing. Refrigerant dissolved in the oil will dilute the sample reducing its viscosity. If an independent laboratory is contracted to perform the analysis, be sure to inform the laboratory the sample contains refrigerant that must be removed prior to the oil viscosity test.

If any of the parameters are outside of the acceptable limits, the oil should be changed.

RCD does offer a Fluid Analysis Service, should the need arise.

Service Bulletins pertaining to this condition:

- SMB990028 – 06N POE Oil Guidelines
  This bulletin was superseded by SMB000056.

- SMB000056 – 06N POE Oil Guidelines
  This bulletin advised of the POE oil guidelines.
- SMB990071 – Totaline Fluid Analysis Service
  This bulletin announced RCD's Fluid Analysis Service.

- PMB03-024 – Totaline Fluid Analysis Services 2003 Price List
  This bulletin describes the services available, with lead times and prices.

Oil Circulation Rate
It is normal to have some oil in circulation. A normal oil circulation rate is 300-500 ppm. A refrigerant sample should have no more than 1000 ppm of oil in circulation.

If higher oil circulation rates are found, check the following items:
- Check for an overcharge of oil. Too much oil in the system will not allow the oil separator to function properly. A history of repeated oil additions might indicate an oil overcharge. A high cooler approach would also indicate excess oil in the circuit.
- Check to be sure that the mesh is in the proper location. This can only be completed with a scope.

Oil Filter
There are 2 oil filters used for the ComfortLink Chillers. Installed in the oil lubrication line is a canister filter, referred to as the external filter. Internal to the compressor is another filter, commonly referred to as the internal filter.

External Oil Filter
The external oil filter has changed since the introduction. The original design had a 10 micron filter rating. The connections have changed several times also. The external oil filter is a 4 micron oil filter in line with the oil piping from the oil separator to the compressor.

Service Bulletins pertaining to this component:
- SMB990068 – 30GX/HX Replacement External Filter History
  This bulletin was superceded by SMB990068A.
- SMB990068A – 30GX/HX Replacement External Filter History
  This bulletin was superceded by SMB000060.
- SMB990072 – 30GX/HX Replacement External Filter History
  This bulletin was a printed in error as a duplicate of SMB990068A.
- SMB000060 – 30GX/HX Replacement External Filter History
  This bulletin was has the history of what filter can be used on which series machines.

Internal Oil Filter

The internal oil filter is a 4 micron oil filter located inside of the compressor housing. An RCD kit, 06NA6600016 includes the internal oil filter and the o-ring needed for the access cap.

On machines built prior to 0101F, a beaded desiccant motor cooling filter drier was used. On some machines, due to the loading conditions, the desiccant could break down. As a result, the internal oil filter would plug with the desiccant material. A solid core filter drier was used in production starting 0101F.

06NA660016 filter kits assembled during the period May through October 2002, (Date Codes E/2, F/2, G/2, H/2, J/2, and K/2, or may not have a date code) may not have the correct size hole for mounting the filter on to the compressor brass fitting that holds the oil filter. If one of these is encountered, the filter will not slide onto the fitting. All parts were put on hold. A new kit was set-up with the correct filter included. The new kit number is 06NA660028.

After the Internal Oil Filter Kit was changed to the 06NA660028 part number, several filters again exhibited the same problem found in the 06NA660016. Suspect packages have a K-2 date code stamped on the package label in the upper right hand corner. Packages stamped with the K-2 date code printed as part of the label in the lower right hand corner will be correct.

Additionally, several reports were received indicating the oil filter plugs were found leaking during extreme cold weather. These reports indicated that the internal oil filters were changed with the 06NA660016 kits and had been operational for some time without a problem. After an investigation, the oil plug o-ring cross section was found to be undersized. The o-ring should measure 0.118 +/- 0.004". The undersized o-ring was inserted randomly, but it is contained within the 06NA660016 filter kit with no date code. These are the same filter packages that are currently on a recall, PMB02-137. There is an alternate o-ring that can be installed, 8TB0847, available through RCD.

The instruction sheet 99TA516075, packaged with the oil filter kits, 06NA660016 and 06NA660028 incorrectly called out the wrong o-ring for the oil filter access plug. The correct o-ring part number is 8TB0847. This information was corrected on Instruction Sheet 99TA516075, Revision D.

Service Bulletins pertaining to this component:

- SMB010008 – 06N Internal Oil Filters Plugging
  This bulletin described the problem with the motor cooling filter drier disintegrating during operation. A solid core filter drier was installed starting with serial number 5200F.
- PMB02-137 – Oil Filter Kit Recall Used On 06N Compressors
  This bulletin described the problem of the undersized mounting and the new kit part number for the correct filter.

Oil Pump
The 30GX Series 0,1, and 2, and 30HX Series 0 machines use an external oil pump to provide pre-start lubrication to the compressor. The pump, KK82TA001 did not have the capacity to provide supplemental oil pressure support during operation.

A replacement motor is available in RCD for this pump. See EPIC for the correct part number.

This pump is prone to seal leaks. As a result, RCD has a seal replacement kit, 30GX660013. Several retrofit kits were also created to change from the original pump to the mag-drive style. The kits are specific to the unit model number.

Unit Model Number	RCD Oil Pump Retrofit Kit
30GX	30GX660005
30HXA	30HX660001
30HXC	30HX660002

With the introduction of Series 3 machines in addition to the pre-start lubrication, supplemental pressure assistance during operation was added with change to a Magnetic Drive Oil Pump. The change to the mag-drive eliminated the external shaft seal on the oil pumps. This pump had more pumping capacity than the previous pump. Two different pumps are used. The KK82TA003 has an internal relief set for 50 ± 7 psid. The KK82TA004 has an internal relief set for 60 ± 7 psid. RCD has superceded the KK82TA003 to the KK82TA004.

RCD has the oil pump capacitor, 6100-9174 and motor, K30237 for separate replacement. The part numbers given are for reference only, confirm with EPIC before ordering these parts.

Service Bulletins pertaining to this issue:
- SMB990019 – 30GX/HX CPM and Oil Pump Changes
  This bulletin described the changes to made to Series 3 machines; the Texas Instruments Compressor Protection Module and the Mag-Drive Oil Pump.

Oil Separator
Oil separators are used on these machines to collect the oil on the high side of the machine. Separate ASME vessels are used with the 30GX and 30HXA machines. On the 30HXC, the oil separator is internal with the condenser. Two separation techniques are used in these vessels. First, the discharge gas is directed to the wall. The force of the gas striking the wall causes most of the oil to cling to the wall and drain into the reservoir. The secondary method is a York mesh. This is a steel mesh inserted into the vessel. Small airborne droplets of oil collect in the mesh. As the droplets increase in size, they eventually fall into the reservoir.

Oil circulation rates for these machines should be less than 100 ppm.

30GX Oil Separators

A common complaint with the oil separators on the 30GX machines is oil leaks at the oil level switch. This problem has not been reported on the 30HXA machines.

For machines that have reported oil leak problems, the following procedure has been developed to correct the situation.

1. Observe all precautions in the literature, on tags, stickers and labels attached to the equipment. Follow all safety codes and precautions that apply.
2. Transfer the refrigerant charge to the high side of the system. Reclaim all remaining refrigerant. Once the refrigerant has been reclaimed, drain the oil from the separator.
3. Disconnect and tag all electrical disconnects.
4. Clean and dry the oil level switch threads as thoroughly as possible. Replace the oil level switch if necessary. Examine the thread (using a mirror and light if necessary) to ensure there is no foreign material present (e.g. cured sealant from the original joint, weld slag, etc). If any such material is found, attempt to remove it with a wire brush. Inserting a ¾"-14 NPT tap can also be used to clean the threads. Use caution when using the tap. Do not cross thread the coupling. Use the tap to chase the threads only.
5. Spray both the internal and external threads with Loctite "7649 Primer N" and allow to dry. This will help to dissolve any residual oil and adds copper ions to the surfaces which act as a catalyst to speed the cure of the sealant.
6. Apply Loctite 565 Thread Sealant, completely covering the external (oil level switch) threads leaving no voids, then assemble and tighten immediately. Prepare the switch prior to the final cleaning/priming of the separator fitting in order to minimize the possibility of residual POE oil seeping into the NPT fitting prior to assembling the joint. Loctite 565 is an anaerobic paste pipe thread sealant that sets up very rapidly, especially when used with the Loctite primer. Loctite recommends this material when sealing joints where there may be small impurities.
7. Check for leaks at the repaired joint. If no leaks are found, evacuate that section of the system and recharge refrigerant and new oil. Start the machine and check its operation.

The use of Teflon tape to make the repair is not recommended. Teflon tape cannot be considered a true sealant. It acts solely as a lubricant, which permits the parts to be assembled to high torque levels. This allows for close mating of parts but does little to seal the helical void that exists at the root and crest of the NPT thread. It is acceptable only for low pressure and/or viscous fluids as are commonly encountered in the plumbing or similar industries. Any attempt to seal the 30GX oil level switch with this material will result in further leakage.

Due to problems with the oil level switch leaking, the 30GX oil separators were changed. A new oil level switch with an o-ring seal was implemented into production, 2800F.

There were a few machines where the York mesh broke free from its mounting. The gas flow through the vessel causes the mesh to move toward the level switch. Eventually, the mesh will cause the float to bind. An external oil level switch can be installed to take the place of the bound level switch.

Troubleshooting:
30GX: Early 30GX machines did not have pressure ports to allow for an external confirmation of the oil level. Caution must be used when confirming an oil level in the separator. Refrigerant will be dissolved in the oil, artificially elevating the level.

Paint
All chillers are painted in American Sterling Grey. RCD stocks a touch-up can of paint for this color under the part number, 313974-751.

Pressure Transducers
A single style of pressure transducer is used for both high- and low-pressure sensing on the 30GX,HX chillers. The transducers operate on a 5 vdc supply. The power supply for this is a 24 vac to 5 vdc full wave rectified power supply, PS1.

Pressure Transducer Calibration
Pressure transducers are factory installed on all models to read Discharge, Suction, Economizer (reads leaving condenser pressure on models without economizer), and Oil pressure. DO NOT attempt to calibrate any of these transducers by the pressure gage method unless the transducer is connected to a fully charged refrigerant system. A more accurate method of calibration is used by the 30GX,HX software and corrects for ambient temperature when calibrating. Calibrating a transducer when the system is under nitrogen charge will result in an incorrect offset being applied to the reading (due to temperature correction). Although these transducers are calibrated at the factory, replacement transducers require calibration for accurate readings. Calibration is also required when replacing a PSIO. Access to the transducer calibration area is through the Service function and the transducers can be calibrated at the current system pressure using a pressure gage at the same point or exposed to atmospheric pressure. In the example listed in Table 12 - Calibrating Pressure Transducers (Pressure Gage Installed), the Circuit A Discharge Pressure transducer has been replaced and needs to be calibrated. A pressure gage has been installed at the transducer and reads 85 psi (must be in the range of –5.0 to 185.0 psi).

Table 12 - Calibrating Pressure Transducers (Pressure Gage Installed)

Keypad Entry	Display Response	Comments
[7][SRVC]	CALIBRATION OFFSET	
[▼]	CIRCUIT A PRESSURE	
[▼]	Discharge Pressure 84.2 PSI	Current reading is displayed.
[8][5][•][0][ENTR]	Discharge Pressure 85.0 PSI	Enter gage pressure to nearest tenth. Control will allow offset of up to 6 psig. Transducer calibration is now complete.

The control will apply the 0.8 psi offset from the calibration example above to all future readings. The calibration process for any of the other pressure transducers is done in a similar manner.

A transducer can also be calibrated at atmospheric pressure by removing the transducer from the system. To do this, carefully unplug the transducer connector. Unscrew the transducer from its mounting location and reconnect the connector. Follow the steps in Table 12 - Calibrating Pressure Transducers (Pressure Gage Installed) to read the current pressure and enter 0.0 psig as the gage pressure. Remove the connector from the transducer, thread the transducer back onto the fitting from which it was removed (do NOT use thread sealant/compound), and reinstall the connector. Maximum offset is 6 psig.

If it is necessary, all of the transducers may be calibrated at 0.0 psig. All of the transducers must be removed from the system and reconnected in atmosphere as described. When complete, scroll down under [7][SRVC] to “Calibrate All at 0 PSIG” and press [1][ENTR]. A “Yes” will be displayed at this step and will automatically change back to “No” once all transducers have been successfully calibrated. Reconnect the transducers and connectors as described above. All transducers are mounted on shrader fittings. Therefore, it is NOT necessary to remove system refrigerant charge. Use a catch pan when removing the oil pressure transducer for calibration, as oil will leak out through the shrader fitting.

CAUTION

Use care when removing the oil pressure transducers from the compressor fitting. The fitting that the transducers mount in is sealed with an O-ring Schrader fitting into the compressor casting. Do NOT over-tighten the transducer when replacing after calibration. Hold both fittings with wrenches when removing and reinstalling.

TROUBLESHOOTING — If transducer is suspected of being faulty, first check supply voltage to transducer. Supply voltage should be 5 vdc ± 0.2 v. If supply voltage is correct, compare pressure reading displayed on keypad and display module against pressure shown on a calibrated pressure gage. If the 2 pressure readings are not reasonably close, replace pressure transducer.

Service Valves
Several styles of service valves are used on the 30GX/HX machines.

Discharge Service Valves
Discharge Service Valves are ball valves installed between the oil separator and the outdoor coil on the 30GX machines. On the 30HXA, it is installed between the compressor and the oil separator. On the 30HXC, it is installed between the compressor and the condenser.

Liquid Line Service Valves
Liquid Line Service Valves for earlier machines were angle valves. This style of valve requires additional steps to maintain the refrigerant seal.

Oil Line Service Valves
There is a single oil line service valve used on the 30HX machines located at the inlet to the external oil filter. This service valve is an angle valve with a Roto-Loc connection. The 30GX machines use this same style at the inlet to the external oil filter. Additionally on the 30GX machines there is an angle valve at each compressor.

Suction Service Valves
Suction Service Valves are factory installed options for both the 30GX and 30HX machines. This device is installed within the suction pipe between the cooler and compressor. An actuator stem protruding from the suction pipe operates the valve. An o-ring seal achieves refrigerant isolation. The actuator opens the valve with a counter-clockwise rotation. A clock-wise rotation will close the valve. The actuator stem has a left-hand thread, locking nut. The locking nut secures the actuator in the position desired.

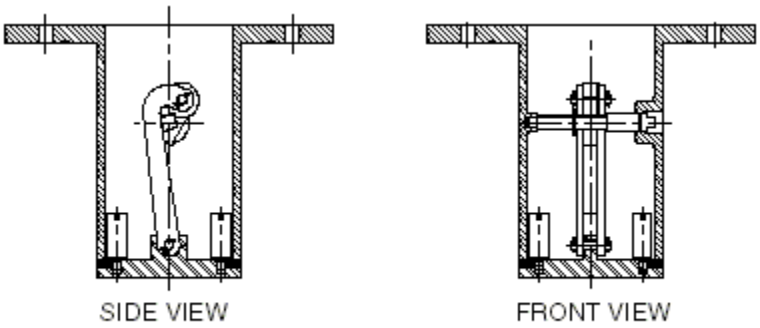

Table 13 - Suction Service Valve

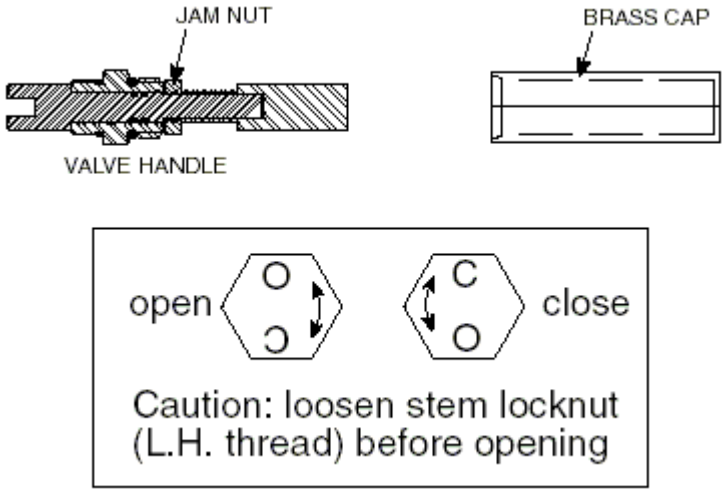

Table 14 - Suction Service Valve Handle

Early Suction Service Valves did not have a locknut on the handle. In some instances, the service valve would close and seal while the compressor was operating.

Service Bulletins pertaining to this situation:

- SMB980073 Suction Service Valve Handle
  This program described the situation of the suction service valves closing during operation and the replacement handle needed to correct the problem.

Refrigerant
The 30GX and 30HXA/HXC machines all use R-134a.

Refrigerant Moisture Limit
The upper limit for moisture in a system is based on the water saturation limit at 35 °F (1.6 °C). This was carried through for HFC/POE systems as well. R-134a has a maximum limit of 625 ppm. The POE oil has a max limit of 100 ppm. Since there is a strong POE/water interaction, the refrigerant limit is too high. The refrigerant limit was established to prevent free water freeze up. As a result, the upper limit has been lowered to the upper limit of the POE moisture limit.

Criteria	Specification Requirement*	Acceptable Limit
Moisture	10 ppm	≤100 ppm

Note: * - The specification requirement refers to the acceptability criteria for new oil based on Carrier Material Specification PS10-34.

If higher moisture content is found, check the following:

- Check for a cooler or condenser leak

If a high moisture content condition is found, repair the leak, evacuate and dehydrate the system using standard refrigerant practices.

RCD does offer a Fluid Analysis Service, should the need arise.

Service Bulletins pertaining to this issue:

- SMB990071 – Totaline Fluid Analysis Service
  This bulletin announced RCD's Fluid Analysis Service.

- PMB03-024 – Totaline Fluid Analysis Services 2003 Price List
  This bulletin describes the services available, with lead times and prices.

Thermistors

The PIC controls system uses a 5 kΩ @ 77 °F (25 °C) thermistor for the Entering Chilled Water Thermistor, Leaving Chilled Water Thermistor, Discharge Gas Thermistor, Outdoor Air Thermistor, and in Master/Slave parallel flow applications, the Lead/Lag Leaving Fluid Thermistor.

For Space Temperature reset, a 10 kΩ @ 77 °F (25 °C) thermistor is required.

T1 – Cooler Leaving Fluid Sensor - This thermistor is installed in a well in the cooler leaving water nozzle.

T2 – Cooler Entering Fluid Sensor - This thermistor is installed in a well in the cooler entering water nozzle.

T5 and T6 – Circuit A and B Discharge Gas Thermistors – These thermistors were installed in wells in the oil separator of the respective circuit.

T9 – Outdoor Air Temperature Sensor – This sensor is a field-installed thermistor. This sensor cannot be used with Dual Chiller Control.

T9 – Dual Chilled Water Sensor – T9 is an accessory sensor used for dual chiller control. This sensor is connected to TB5-7 and TB5-8. A field installed well for this sensor is recommended in the common header chilled water supply pipe. The thermistor is a 5k Ω thermistor and is connected to the Main Base Board via a terminal block. With Dual Chiller Control the Outdoor Air Temperature Sensor cannot be used.

T10 – Remote Space Temperature Sensor - Sensor T10 is an accessory sensor that is remotely mounted in the controlled space and used for space temperature reset. This sensor is connected to TB5-5 and TB5-6. The sensor should be installed as a wall mounted thermostat would be, in the conditioned space where it will not be subjected to either a cooling or heating source or direct exposure to sunlight, and 4 to 5 ft above the floor.

For the above sensors, either voltage drop or resistance can be used to verify accuracy of the thermistors.

Starting around Serial Number 0699F, several improvements to the 5 kΩ thermistor construction were implemented into this product family. The improvements provided a better water seal for the devices.

Service Bulletins pertaining to this issue:

- SMB990029 – Thermistor Improvements
  This bulletin described the changes to the thermistor construction.

The compressor motor thermistors are also 5 kΩ @ 77 °F (25 °C) thermistors, but have a slightly different curve than the thermistors previously discussed. A different temperature vs. resistance chart is required to verify the accuracy of the thermistor. Voltage drop cannot be used to check accuracy for the compressor motor thermistors.

Replacement:

CAUTION

T1, T2, T5, and T6 thermistors are installed in wells and will slide out of the wells easily. The wells are under refrigerant pressure (cooler EWT and LWT are under waterside pressure) and do not need to be removed to replace a faulty thermistor.

Water Analysis

To aid in the determination of a root cause for a cooler failure, it is recommended that a water sample be analyzed. If the work is to be performed by an independent laboratory, the following items should be checked:

A water analysis consists of the following tests:

pH
Calcium, ppm as $CaCO_3$
Magnesium, ppm as $CaCO_3$
Iron, ppm
Chloride, ppm
Sulfate, ppm as SO_3
M alkalinity, ppm as $CaCO_3$
P alkalinity, ppm as $CaCO_3$
Silica, ppm as SiO_2
Nitrate, ppm as NO_3
Suspended Solids, ppm
Appearance/Comments

Additional tests could include:

Phosphate, ppm as PO_4
Fluoride, ppm
Boron, ppm
Sodium, ppm
Potassium, ppm
Ammonia, ppm as NH_4
Aluminum, ppm
Hydrogen Sulfide, ppm as H_2S

RCD does offer a Fluid Analysis Service, should the need arise.

Service Bulletins pertaining to this issue:

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  This bulletin announced RCD's Fluid Analysis Service.

- PMB03-024 – Totaline Fluid Analysis Services 2003 Price List
  This bulletin describes the services available, with lead times and prices.

MAINTENANCE

Recommended Maintenance Schedule

The following are only recommended guidelines. Job site conditions may dictate that maintenance schedules be performed more often than recommended.

Routine:

For 30GX machines with E-coat Condenser Coils:

- Check condenser coils for debris, clean as necessary
- Periodic clean water rinse, especially in coastal and industrial applications.

Every month:

For all machines:

- Check Sightglass Dry Eye for moisture. If moisture is indicated, obtain and test an oil sample, change as necessary. Check the chilled water loop for signs of refrigerant, which may indicate a cooler leak.

For 30GX machines with E-coat Condenser Coils:

- Check condenser coils for debris, clean as necessary
- Coil cleaning with Environmentally Sound Coil Cleaner.

Every 3 months:

For all machines:
- Check all refrigerant joints and valves for refrigerant leaks, repair as necessary
- Check oil filter pressure drops, replace as necessary
- Check chilled water flow switch operation

For 30GX machines:
- Check condenser coils for debris, clean as necessary
- Check condenser fan operation

Every 12 months:

For all machines:
- Check all electrical connections for tightness, tighten as necessary.
- Check calibration of all transducers for each circuit, recalibrate/replace as necessary
- Check accuracy of thermistors, replace if greater than ± 2 °F (1 °C)
- Obtain and test an oil sample, change as necessary
- Check cooler approach (Cooler Leaving Water Temperature – Saturated Suction Temperature), clean tubes if appropriate
- Check to be sure that the proper concentration of antifreeze is present in the chilled water loop
- Check to be sure that the proper amount of inhibitor is present in the chilled water loop.
- Check all refrigerant strainers and filter driers for pressure drops, replace/clean as necessary
- Check chilled water strainers, clean as necessary
- Check the processor battery.

For 30GX machines:
- Check cooler heater operation

For 30HXC machines:
- Check Condenser Water Regulating Valve operation, if equipped
- Check condenser approach (Saturated Condensing Temperature – Condenser Leaving Water Temperature), clean tubes if appropriate
- Check to be sure that the proper amount of inhibitor is present in the condenser water loop.
- Check condenser water strainers, clean as necessary

Every Four (4) years
- Replace the PSIO1 battery