GARDNER DENVER®

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AUTO SENTRY®
RS2000
AIRPILOT +
CONTROLLER

OPERATING AND
SERVICE MANUAL

GARDNER DENVER

MAINTAIN COMPRESSOR RELIABILITY AND PERFORMANCE WITH GENUINE GARDNER DENVER® COMPRESSOR PARTS AND SUPPORT SERVICES

Gardner Denver Compressor genuine parts, manufactured to design tolerances, are developed for optimum dependability – specifically for Gardner Denver compressor systems. Design and material innovations are the result of years of experience with hundreds of different compressor applications. Reliability in materials and quality assurance are incorporated in our genuine replacement parts.

Your authorized Gardner Denver Compressor distributor offers all the backup you'll need. A worldwide network of authorized distributors provides the finest product support in the air compressor industry. Your local authorized distributor maintains a large inventory of genuine parts and he is backed up for emergency parts by direct access to the Gardner Denver Master Distribution Center (MDC) in Memphis, Tennessee.

Your authorized distributor can support your Gardner Denver air compressor with these services:

1. Trained parts specialists to assist you in selecting the correct replacement parts.
2. Factory warranted new and remanufactured rotary screw airends. Most popular model remanufactured airends are maintained in stock at MDC for purchase on an exchange basis with liberal core credit available for the replacement unit.
3. A full line of factory tested AEON™ compressor lubricants specifically formulated for use in Gardner Denver compressors.
4. Repair and maintenance kits designed with the necessary parts to simplify servicing your compressor.

Authorized distributor service technicians are factory trained and skilled in compressor maintenance and repair. They are ready to respond and assist you by providing fast, expert maintenance and repair services.

For the location of your local authorized Gardner Denver Air Compressor distributor, refer to the yellow pages of your phone directory or contact:

Distribution Center:
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Phone: (901) 542-6100
(800) 245-4946
Fax: (901) 542-6159

Factory:
Gardner Denver
1800 Gardner Expressway
Quincy, IL 62301

Phone: (217) 222-5400

Fax: (217) 224-7814

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GENERAL INFORMATION

GENERAL DESCRIPTION

The rotary screw compressor is prewired with all controls, motor, and starter for the voltage and horsepower at the time of ordering. It is necessary only to connect the compressor unit to the correct power supply and to the shop air line (and to the appropriate water supply if water cooled). A standard compressor unit consists of the compressor, oil reservoir, oil cooling system and filter, motor type as specified, NEMA 12 starter / control box, and control components as described in the package instruction manual.

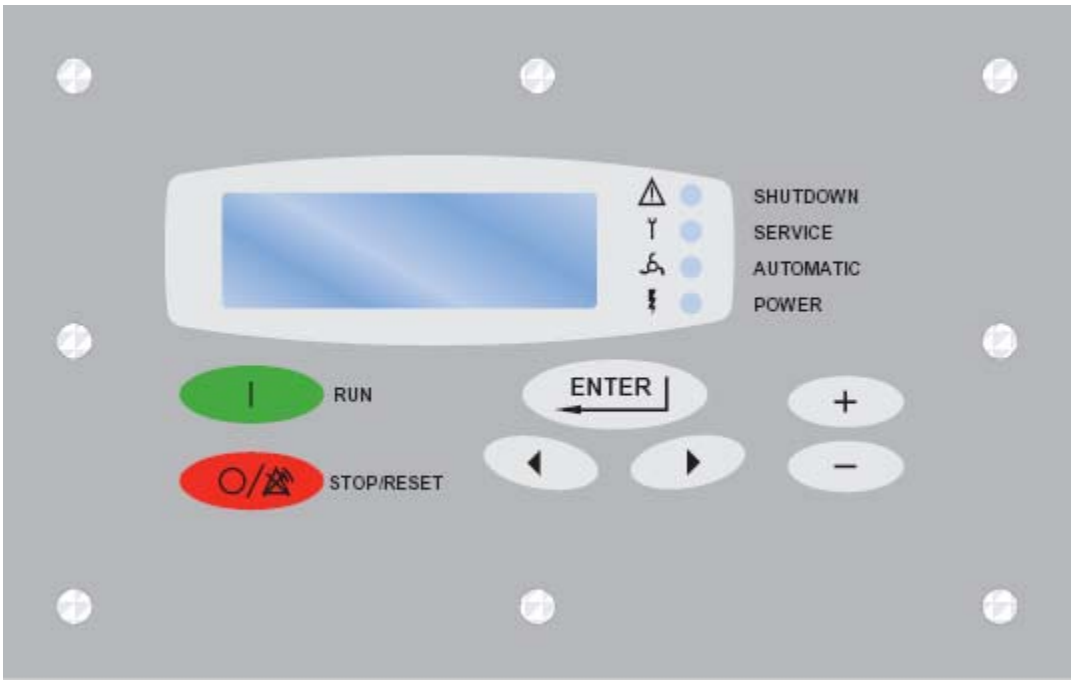


Figure 1-1 - KEYPAD

Two versions of operating software are available for the AUTO SENTRY® controller. Section 2 covers the common operating instructions and features of the controllers. Section 3 details the features and adjustments for the standard operating software. Section 4 details the features and operation of special software.

Software is contained in a large integrated circuit on the main circuit board. This is labelled with the software version and part number. The software version is briefly displayed whenever the controls are turned on.

This compressor unit features the AUTO SENTRY controller, which integrates all the control functions under microprocessor control. Its functions include safety and shutdown, compressor regulation, operator control, and advisory/maintenance indicators. The keypad and display provide the operator with a logical and easily operated control of the compressor and indication of its condition.

SECTION 2
AUTO SENTRY OPERATION

OPERATING THE COMPRESSOR

The two keys on the left side of the keypad control the operation of the controls. Prior to starting, press the [STOP/RESET] key to place the controller into its READY state (as indicated on the display). Press the [RUN] key to start compressor operation. The green LED will light near the automatic operation symbol whenever operation is enabled. Once operating, the selected operating mode is displayed in the lower right corner of the message window.

Press the [STOP/RESET] key at any time to stop the compressor under normal conditions. If the compressor has been running, the reservoir will first be relieved of pressure before stopping the motor. The display will count down to zero during the normal stop.

⚠ WARNING

Automatic restarting or electrical shock can cause injury or death. Open and lock main disconnect and any other circuits before servicing unit.

While operating and running, the unit may be manually unloaded by pressing and holding the [RUN] key. This unloads a running compressor after several seconds, and will prevent loading while the key is held down. When the key is released, the control resumes its normal operation as required.

An optional control may be wired into the controller to interrupt and restart the unit based on controls by others. When stopped by these controls, the display indicates “REMOTE HALT”.

In any mode, the compressor will start only if reservoir pressure is below 5 psig. The display will indicate if the control is waiting for a reservoir blowdown, along with the remaining pressure. The controls also delay initial loading of the compressor until a startup delay has been completed.

AUTO SENTRY CONTROL DISPLAY

The display above the keypad provides operating information to the user. If a shutdown has occurred, the display indicates the cause.

During normal operation, the display shows the system (plant) pressure, compressor discharge temperature, total running hours, and operation mode. Alternate displays are available by pressing the keypad cursor [<][>] keys, and will be identified on the display. These include:

1. Air/oil reservoir pressure RES PRES
2. Separator differential pressure DIF PRES
3. Air/oil reservoir temperature RES TMP
4. System discharge pressure DIS PRES
5. Air end discharge temperature DIS TMP
6. Remaining blowdown time BD TMR
7. Remaining auto time AUTO TMR
8. Total running hourmeter TOT HRS
9. Loaded operation hourmeter LOAD HRS
10. Software name and version

Service information may also be displayed while the compressor is running. Press the [+][-] keys to display the following:

1. Est. hours till next recommended oil change
2. Hours till next recommended oil filter change
3. List of any active advisory messages

If no keys are pressed for 5 seconds, the display will revert to its normal mode.

The display is also used as a service reminder for normal maintenance items. If service is recommended, the yellow advisory LED next to the service symbol will come on, and a message will alternate with the normal lower line display. These messages are intended to advise of conditions which may lead to a shutdown.

If a protective shutdown occurs, the red shutdown LED next to the shutdown symbol will come on and the top line of the display will indicate "SHUTDOWN". The lower line indicates the cause of the shutdown.

SERVICE ADVISORIES

The controller turns on an advisory when it detects operation which needs service attention, but does not warrant shutting down the compressor. Some of these are normal maintenance procedures and are intended to serve as a reminder to perform routine service. Others are conditions which can reduce the maximum compressor performance. It will remain in effect until reset. Check the display during routine inspections and perform maintenance as suggested. Refer to the troubleshooting section for detailed information about each advisory.

Temperature advisories may be cleared while the unit is running by simply pressing the [ENTER] key. To reset the service advisories, press the [STOP/RESET] key to stop operation of the compressor. After it has stopped, disconnect power and service as required. After servicing, restore power and reset the controller as indicated in the programming / maintenance section below.

PROTECTIVE SHUTDOWNS

The controller will shut down the unit following any fault detected in the following devices. Long-term problems will have a brief blowdown period before fully shutting down. Following a shutdown, a message will be displayed, with the top line indicating "SHUTDOWN" and the lower line indicating the cause. The shutdown light will be steadily lit if the cause still exists, or will flash if the cause has been cleared. Refer to the troubleshooting section for detailed information about each shutdown. To resume operation, the cause of the shutdown must be corrected and the controller reset by pressing the [STOP/RESET] key.

Motor Protective Devices - Overload heaters are furnished for the starter in the voltage range specified. There are three (3) overloads in the starter of proper size for the starter and its enclosure. Note that motor nameplate current must be multiplied by 0.577 for wye-delta starters. The display will indicate that an overload relay has tripped. The overload relay is reset by pressing the button on the relay itself, then the controller may be reset. Motor current (amps) and voltage must be measured in the affected motor wiring to locate the cause for high current. Proper starter coil and contact action is also monitored and errors in operation will cause a shutdown with the cause displayed as a starter or starter contact error.

High Temperature - The compressor is protected from high discharge temperature by a thermistor probe located in the compressor discharge. The controller will shut the compressor down if temperature exceeds 225° F (or as set in setup adjustments) or if rapid temperature rise is detected. Reservoir/Separator temperature is also monitored, and will provide high temp shutdowns. The location of the temperature fault will be displayed. Thermistor probes are also checked for open or shorted circuits, and the display will indicate the location of the defective probe.

CAUTION

Machine damage will occur if compressor is repeatedly restarted after high temperature stops operation. Find and correct the malfunction before resuming operation.

Separator Differential Pressure - The pressure drop across the separator is continually monitored by the controller. The unit will be shut down at a differential pressure of approximately 15 psid.

The pressure drop can be monitored at any time by selecting the DIF PRES alternate display. This should be checked while the compressor is delivering at full capacity. A service advisory comes on to recommend maintenance prior to this shutdown.

High Pressure - The controller will first attempt to unload and blow down the unit if excessive pressures are detected in the reservoir or the plant system. If unsuccessful, a shutdown will occur. Shut down will also occur if a defective transducer is detected, or improper zero adjustments are detected. The display will indicate the location of the high sensed pressure or transducer (xducer) error. Check that all adjustments have been properly made, and all connections are secure.

Low Sump Pressure - The controller will shutdown the unit if inadequate reservoir pressure is detected after loading the compressor. If this occurs, check the wiring and piping to the solenoid valves.

Emergency Stop - Press the emergency stop button to shut down the unit and the controller. To restart, pull the button out to its normal position and reset the controller. This should be used for emergency purposes only - use the keypad [STOP/RESET] for normal controlled stopping.

Power Failure - Following power interruptions, the controller will remain in a shutdown state (unless programmed for auto restart).

Connection Failure - The controller checks input connectors and will shutdown if they become unplugged.

Other Shutdowns - The controller runs continuous diagnostic checks of its own operation and the sensors to which it is connected. Refer to the service section for a complete listing of shutdowns and remedial actions.

OTHER CONTROL FEATURES

Auto restart after power failure - The controller normally displays "SHUTDOWN - POWER FAILURE" after power has been interrupted and restored. Press the [STOP / RESET] key and press [RUN] to restart compressor operation.

If programmed for automatic restart, the controller pauses and begins counting down when power is restored. This time is adjustable in the programming steps. This must be at least several seconds, but may be set longer to allow other plant loads to start up first. After the countdown is complete, the controller resumes the mode of operation prior to the power interruption.

A flashing green power indicator advises that the unit has been set for automatic restart after power failure. A steady green light indicates auto restart is disabled.

SECTION 3
RS2000 V4.xx INSTRUCTIONS

OPERATING MODES

Version 4 software provides four operating modes. These may be selected in the adjustments. While operating, the selected mode is displayed in the lower right corner of the message window.

Constant Run Mode Operation - This mode is best used in applications where there are no long periods of unloaded operation, or for minimum response time to sudden demands. The compressor unit will start and run continuously, using its controls to load and unload the compressor. This matches average delivery to demand.

When the air demand is less than the compressor capacity, the pressure rises to the unload point of the control. It will then unload (but not blow down) and will not deliver any air to the system. Air demands are supplied by air stored in receivers and plant piping. When the pressure falls to halfway between the unload and load pressures, the controller again fully loads the compressor.

When first starting, the controller will keep the compressor fully unloaded and blown down until the system pressure drops below the load pressure. Once loaded, the reservoir will remain fully charged, regardless of demand. Responses to demand are thus immediate, and pressures are maintained in the upper portion of the programmed control band.

The BD timer and Auto timer are not used while in this mode.

Low Demand Mode Operation - The low demand mode reduces power consumption by relieving pressure in the reservoir during unloaded operation. This mode is best used where there is moderate air storage and there are unloaded periods during the day, but frequent motor starting and stopping is undesirable. During periods of moderate to high demands, this mode is identical to the constant-run mode described above.

During low demand periods, the controller will also open the blowdown valve while unloaded, to minimize the motor load. A timer is reset when this occurs. Plant demands and control air pressure are supplied from the plant air system while the compressor is unloaded. When the system air pressure drops to the load pressure, the blowdown valve recloses and the compressor fully loads.

Subsequent blowdown periods are not allowed until the timer has completed its cycle. This cycle eliminates frequent blowdowns during moderate loads, and the energy required to repressurize the reservoir. The timer is adjustable from 1 to 20 minutes.

The Auto timer is not used while in this mode.

Automatic Mode Operation - This mode provides automatic start and timed stop, and is best used in applications with long unloaded periods and adequate storage to allow the compressor to be stopped for periods of light demands. Operation during periods of moderate to heavy demands are identical to the low demand and constant run modes described above.

The automatic time delay is adjustable from 1 to 20 minutes. If the controller operates unloaded for this period with no demand, the compressor drive motor is halted to eliminate its power consumption. The controls will remain in this state until pressure drops below the load pressure.

This is the most commonly selected mode of operation, as it automatically will operate the compressor unit in the most efficient manner for the demand of the air system.

Sequence Mode Operation - This mode provides for communication between controllers, operating only as many as are required for economical operation. This is best used on applications with large storage capacity and diverse loads.

Each unit operates identically to the automatic mode, with adjustments made only when other units (up to 8 total) are connected and operated in sequence mode. This provides a robust system, tolerant of any interruption of any member, and tolerant of interruption in the communications cable. For more information, refer to the sequencing instructions later in this chapter.

A "unit number" must be assigned to each unit in this mode, but the display will indicate the unit's actual operating ranking.

PROGRAMMING AND SETUP FOR THE "AUTO SENTRY RS2000" CONTROLLER

Programming and setup is accomplished with the PROGRAM keys. See Figure 1-1 Keypad. In all steps, the [ENTER] key enters the displayed value into memory and advances to the next programming function. The plus [+] and minus [-] keys will increase and decrease displayed numeric values, or step through menu selections. During numeric adjustments, the left [<] and right [>] arrow keys, move the cursor (flashing digit) to the position desired. Use the [+] and [-] keys to change the number at the cursor. At any point in the programming and setup routine, the [STOP/RESET] key can be pressed to exit the adjustment mode without altering the adjustment. In all steps of the programming routine, the top line of the display will give a description of the parameter to be programmed, while the bottom line shows the variable that may be altered or stored.

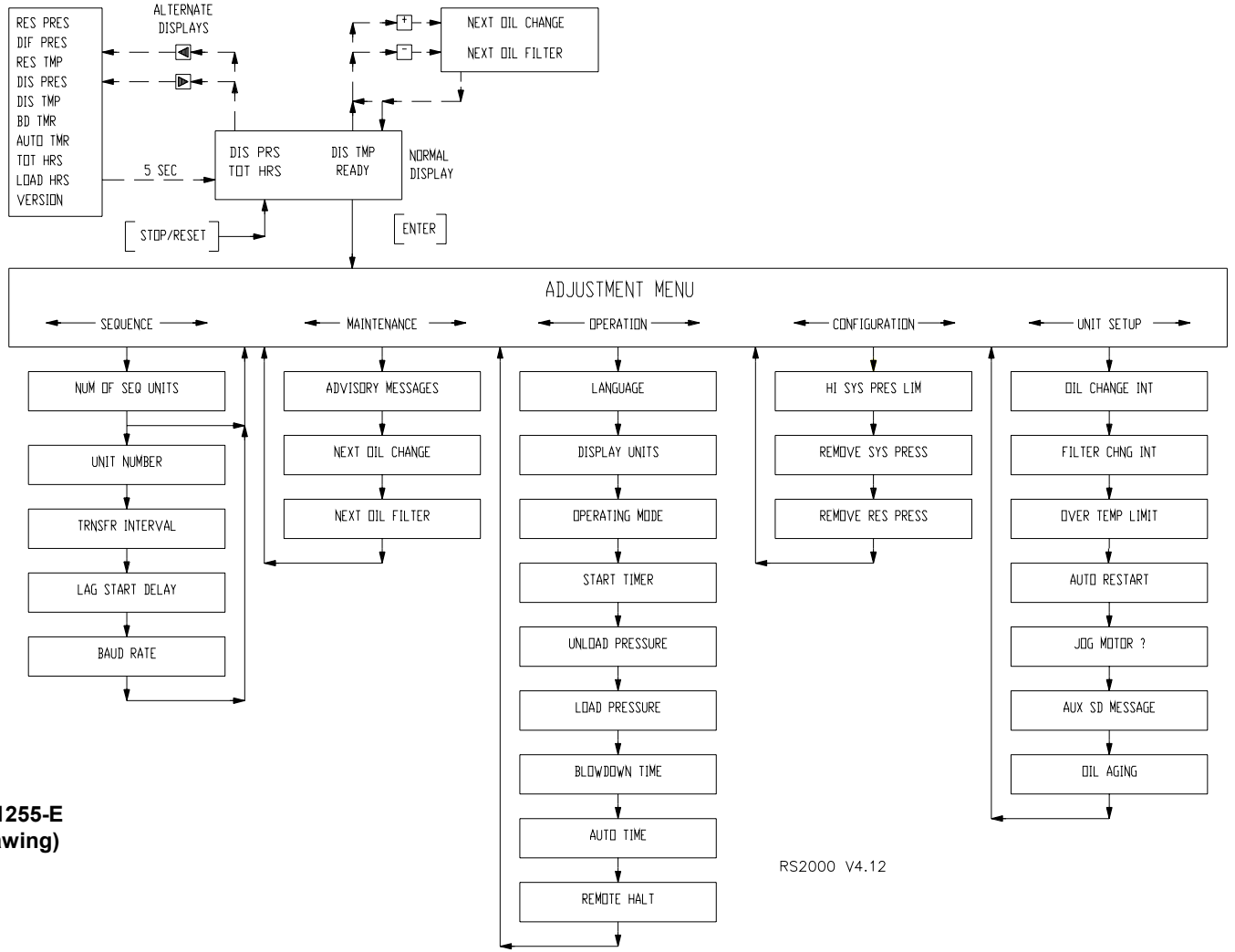
The following is a step by step guide to programming the controller. Remember, between each step, it is necessary to press the [ENTER] key to store the new value and advance to the next step.

Main Adjustments Menu

1. The compressor must be stopped prior to making any adjustments. If the unit is running, press the [STOP/RESET] key to place the control in the "READY" state.

   Adjustments can also be performed from the "SHUTDOWN" state. After adjustments are completed, the "AUTO SENTRY RS2000" controller returns to this state until the cause is repaired and the controller is manually reset.

2. Press the [ENTER] key to begin programming. This enters the adjustments menu. The adjustments are broken into five groups as shown in Figure 3-1. To select a group, press [+] or [-] until the desired group is shown on the bottom line of the display. Press [ENTER] to proceed to the group adjustments detailed below.



300EBC1255-E
(Ref. Drawing)

Figure 3-1 – FLOW CHART FOR SETUP PROGRAMMING – V4.xx

Operation Adjustments

1. In the top line, "LANGUAGE" is indicated. The bottom line will indicate "ENGLISH" or an alternate language for display messages. Select the desired display language and press [ENTER] to proceed.

   If a controller is set for another language, press the [STOP/RESET] key, press [ENTER] twice, and press the [+] or [-] key to select ENGLISH at this step. Then press [ENTER] to select the language.

2. In the top line, "DISPLAY UNITS" is indicated. The bottom line will indicate "ENGLISH" (PSIG, Fahrenheit) or "METRIC" (Bars, Celsius) units of measurement. Select the desired display units and press [ENTER] to proceed.

3. The top line displays "OPERATING MODE". The bottom line indicates the selected mode. Refer to the description of modes at the beginning of this chapter. Select the desired mode, using the [+] or [-] keys. When the desired mode is shown, press the [ENTER] key to save and proceed.

4. In the top line, "START TIMER" is displayed. The bottom line will indicate a time between 2 and 10 seconds. This is the time that the controller spends in the unloaded 'start' mode. This also controls the operation of package-mounted wye-delta starters, if so equipped. Set this adjustment for the amount of time needed for the motor to reach its highest speed while starting. This is typically 3 seconds for full-voltage starters, 7-9 seconds for wye-delta starters.

   If a remote-mounted, reduced voltage starter is used, set this adjustment 1-2 seconds longer than the starter's internal timer.

5. "UNLOAD PRESSURE" is displayed and adjusted next. The bottom line will indicate a pressure value. It is to be set at the nameplate rating of the compressor for normal operation. Under NO circumstances, is this adjustment to be set in excess of the compressor nameplate pressure. It may be set lower, if desired, to reduce pressure and power consumption.

6. In the top line, "LOAD PRESSURE" is displayed. The bottom line will indicate a pressure value. This setting determines the point at which machine startup occurs in AUTO and SEQUENCE modes and when the compressor will load up from the blown down condition. Note that LOAD PRESSURE can be set up to 5 PSI below UNLOAD PRESSURE. Set this lower to reduce compressor cycling. All sequenced machines must have the same programmed UNLOAD and LOAD PRESSURE setpoints.

7. In the top line, "BLOWDOWN TIME" is displayed. The bottom line will indicate a time between 1 and 20 minutes. It is factory set at 10 minutes. This is the minimum time interval between blowdowns. A longer blowdown time minimizes wasteful dumping of compressed air when loading is likely to occur in a short time.

8. In the top line, "AUTO TIME" is displayed. The bottom line will indicate a time between 1 and 20 minutes. It too, is factory set at 10 minutes. Its function is to prevent too frequent motor starting, and to allow the motor a 'cool-down' period before stopping.

9. In the top line, "REMOTE HALT" is displayed. The bottom line indicates either "TIMED" or "IMMEDIATE". Refer to the description of "Remote On / Off" later in this section for additional details. Select the desired response to the remote input and press [ENTER] to proceed.

10. This completes the operational adjustments. The controller will return to the main adjustments menu.

Maintenance Adjustments

1. If any service advisories are in effect (yellow ADVISORY indicator is on), they will be displayed on the top line. The bottom line indicates "LEAVE ADVISORY" (do not reset) or "CLEAR ADVISORY" (turn it off). Select the desired action and press [ENTER] to proceed.

   Note that both the "CHANGE OIL" and "CHANGE OIL FILTER" advisories are based on operating time. These timers are not automatically reset on the controller when the advisory is turned off, and the advisory will come back on shortly after the unit starts running. If the oil or filter has been changed, clear the advisory as noted above, then proceed to the following steps to reset the appropriate timer back to its full value.

2. The top line displays "NEXT OIL CHANGE" and the estimated hours remaining are displayed on the bottom line. The actual time will be affected by operating conditions which affect oil life. Press the [+] or [-] keys to switch to the oil change interval (see UNIT SETUP) if service was performed early. Press again to change back to remaining time. When the desired value is shown, press [ENTER] to save and proceed to the next step.

   If the advisory message is on, it must be cleared as noted in step 1.

3. The top line displays "NEXT OIL FILTER" and the hours remaining are displayed on the bottom line. Press the [+] or [-] keys to switch to the oil filter interval (see UNIT SETUP) if service was performed early. Press again to change back to remaining time. When the desired value is shown, press [ENTER] to save and proceed.

   If the advisory message is on, it must be cleared as noted in step 1.

4. This completes the maintenance adjustments. The controller will return to the main adjustments menu.

Sequence Adjustments

See "SEQUENCING COMPRESSORS WITH THE AUTO SENTRY RS2000" for more details on setting up and optimizing a sequenced compressor installation.

1. In the top line, "NUM OF SEQ UNITS" is displayed. The bottom line will indicate a number in the range of one through eight. This will be factory set at "1". This should be set to a number corresponding to the number of compressors that are currently installed on this air system that also have "AUTO SENTRY RS2000" controllers. It should be noted that <u>all</u> controllers on the system must have the same number programmed here to operate correctly in SEQUENCE mode. Adjust as required, and press [ENTER] to proceed.

NOTICE
Setting the value in Step 1 to one indicates that no sequencing is to take place. Consequently, Steps 2, 3 and 4, which relate to sequencing, are skipped by the controller. The adjustments will continue with Step 5.

2. In the top line, "UNIT NUMBER" is displayed. The bottom line will again indicate a number of one through eight and be factory set at "1". Enter a different number for each controller in a sequenced system. The sequence mode will not function properly if two or more compressors have the same UNIT NUMBER. Example: 1, 2, and 3 for a three compressor installation.

   This is the only setting which must be different for each member of a sequenced system. All other settings should normally be the same for all members.

3. In the top line, "TRANSFER INTERVAL" is displayed. The bottom line will indicate a number of hours in the range of 1 to 5000. It is factory set at 24. This is the number of hours that this machine will stay in the role of "lead" compressor.

   Normally it is desirable to set this to the same value on all sequenced units to equalize running hours. Different values may be programmed, if desired, to help equalize hours.

4. In the top line, "LAG START DELAY" is displayed. The bottom line will indicate a number in the range of 1 to 600 seconds. It is factory set at 30. This is the length of time this machine will wait before starting when the pressure drops below the reset point. This delay period begins when a previous member of the system is loaded. This should be set to the same value for all sequenced units. Its setting will depend on the amount of air storage volume in the system. Too small a number will result in more compressors being started than is necessary to satisfy demand.

5. The controller displays "BAUD RATE" on the top line, and a selection of "1200" or "9600" on the lower line. 1200 baud is recommended for most applications. The 9600 baud rate may be used for higher data transfer rates. All units in the system must be set the same. Select the desired value, and press [ENTER].

6. This completes the sequence adjustments. The controller will return to the main adjustments menu.

Configuration Adjustments

1. In the top line, "HI SYS PRES LIM" is displayed. The bottom line will indicate a value that is factory set 20 - 25 PSI above name plate. This is the pressure that will cause a shutdown if exceeded due to a malfunction such as a stuck inlet valve or broken control line. This should be set at or slightly below the rating of the pressure relief valve. The controller will attempt a number of actions as it approaches to prevent the pressure from reaching this limit.

NOTICE
The controller will automatically adjust the set and reset pressures as required if this limit is lowered.

2. In the top line, "REMOVE SYS PRESS" is displayed. The bottom line displays the current pressure being sensed at the package discharge. At this point, steps must be taken to ensure that system pressure is, in fact, zero psig. Remove the pressure line to the system pressure transducer. Pressing [ENTER] will now cause the controller to calibrate the transducer output to zero PSIG. Obviously, pressure measurement errors will be encountered if 'zeroing' is done with pressure at the transducer. If large errors are detected, the controller will demand that the transducer be checked.

3. In the top line, "REMOVE RES PRESS" is displayed. The bottom line displays the current pressure being sensed in the reservoir. The reservoir pressure transducer may now be 'zeroed' by following the steps outlined in step 2 above.

4. This completes the configuration adjustments. The controller will return to the main adjustments menu.

Unit Setup Adjustments

1. In the top line, "OIL CHANGE INTERVAL" is displayed. The bottom line will indicate a time interval of 1000 to 12000 hours. After the machine has run for the programmed setting, an advisory will be displayed, requesting an oil change. Adjust as desired and press [ENTER] to proceed.

2. In the top line, "FILTER CHNG INTERVAL" is displayed. The bottom line will indicate a time interval of 500 to 1200 hours. After the machine has run for the programmed setting, an advisory will be displayed, requesting an oil filter change. Adjust as desired and press [ENTER] to proceed.

3. In the top line, "OVER TEMP LIMIT" is displayed. The bottom line will indicate 225 degrees F. This is the proper setting for compressor operation with conventional coolant. It may be set higher for high temperature oils, per the manufacturer's instructions. It may be temporarily lowered to verify the function of the temperature shutdown system.

4. In the top line, "AUTO RESTART" is displayed. The bottom line will indicate either "OFF" or "ON". The factory setting is "OFF", and the controller will display a power failure shutdown after power has been restored.

   Set this feature to ON when it is necessary to have the compressor automatically restart after a power interruption. There will be a brief delay, then the control resumes the mode it was in prior to the interruption. This feature shall only be enabled when the owner determines that it is safe to do so. It is recommended that compressor access be limited to only trained service personnel when this feature is used.

5. This step is only encountered if the AUTO RESTART function was set to ON in the previous step. In the top line, "RESTART DELAY" is displayed. The bottom line will indicate a time between 5 and 30 seconds. It is factory set at 10 seconds. This is the amount of delay introduced before restarting after power has been restored. Set it as desired to allow time for power to stabilize before starting compressors.

6. The display now reads "JOG MOTOR?" and indicates the amount of time to energize the starter. Adjust with the [+] or [-] key to the smallest value needed to bump the motor and check rotation. 0.1 to 0.2 seconds is normally adequate for factory-furnished full-voltage starters; wye-delta or remote starters may require a little more time. Set back to zero to proceed to the next step.

7. In the top line, "AUX SD MESSAGE" is displayed. The bottom line will display the message which will appear if power is removed from terminal 6. Select the most appropriate message for user-furnished shutdown devices, and press [ENTER] to proceed.

8. On the top line, **"Oil Aging"** is displayed. Select between **"Standard"** or **"High Temp"** on the second line. This will change how fast the oil change timer will increment when using high temperature oil such as AEON 9000TH.

9. This completes the unit setup adjustments. The controller will return to the main adjustments menu.

SEQUENCING COMPRESSORS WITH THE "AUTO SENTRY® RS2000"

General - The sequencing mode is used to operate multiple compressors in a common plant air system. The individual units operate similarly to operation in the automatic mode, except that the setpoints are under control of the sequencing system. This system is actually distributed among the individual controllers and compressor units, with communications between them to keep the system coordinated. Sequencing is intended to start, run, unload, blowdown, and stop compressors in response to changes in demand during the day or week.

The "AUTO SENTRY RS2000" controller is designed for systems of two through eight compressors piped into a common air receiver for distribution to the plant. In any such system, the receiver is an important part of the application; it supplies air to the plant and allows compressor units to be unloaded and stopped. This stored reserve eliminates the need to operate "spinning reserve" of unloaded compressors. This storage may be an air receiver, or may be the volume of air in a large distribution system. In either case, the compressors must be piped to this volume with a minimum of restriction. The control system will operate only as many compressors as are needed to supply the CFM demand of the plant, and to maintain the compressor system pressure between the LOAD and UNLOAD pressures programmed into the controllers.

The controllers are completely set up to operate this system. The only required additional part is the cable which runs from controller to controller. A kit, 200EAP752, is available which contains all material needed to sequence up to five compressors. This kit contains 500 feet of cable, eight modular connectors, and a crimping tool to install the connectors.

In spite of the fact that it is a standard feature and its inherent installation simplicity, the sequencing function of a multi-compressor "AUTO SENTRY " system is the most fully-featured, functionally-complete available today.

Compressor System - A proper sequencing installation requires two or more Gardner Denver rotary air compressors complete with "AUTO SENTRY RS2000" controllers, piped into a common air system, interconnected as described above. For best performance, connect the units directly to a common header and receiver, without any intervening dryers, filters, or other restrictions. If any equipment must be installed on individual compressors, select equipment with minimum pressure drop. If filters are installed, establish a maintenance procedure to prevent clogging filters from upsetting the system. There should be no check valves or other devices which isolate a member from the air system. During operation, be sure that any unit is taken out of the sequence mode before closing its service valve.

The receiver should also be sized to prevent excessive drops or rapid rises in pressures during the operation as described below. Note that "receiver" really applies to the entire storage volume of a physical receiver and the volume of the air distribution throughout the plant.

With load-unload compressors, large volume or wide differential may be needed to prevent unnecessary starts or rapid compressor cycles. Note that when demand exceeds the capacity of the running unit(s), there will be a delay until the next unit starts and delivers additional air. The stored air serves the plant during this period. With a properly sized receiver, pressure changes on a receiver gauge should be very slow and gradual.

All standard practices common to sound air compressor installations such as proper sizing of piping, proper electrical supply and conductor sizing, and grounding are to be observed. Run the compressors in the system in Automatic mode for at least one week to evaluate system performance.

Sequencing Installation - Once the compressor system is set up, sequencing compressors with the controller is as simple as plugging in a telephone to a wall jack. The only item required to make the system functional is a cable similar to a phone cable. The cable and connectors used in kit 200EAP752 have been specially selected to meet the needs of an industrial application. One less cable than the number of compressors to be sequenced is required. For example, to sequence four compressors, three cables are required.

The serial communications interface meets RS-485 standards, the most widely used interface in harsh, industrial environments today. However, the communications cables should be routed through metallic conduit to provide them with both mechanical protection and electromagnetic shielding. Do not run the communications cable in a conduit with other wiring.

Each controller circuit board has two modular jacks which accept RJ-12 telephone plugs. One jack is vacant, the other has a short pigtail plugged into it. To interconnect two compressors, plug the cable into the vacant jack on each controller. For installations of more than two units, the pigtail plug must be disconnected on all controllers except the two at each end of the communications line. The order of interconnection has no effect on the system operation. The following conditions are necessary and sufficient for proper operation:

1. Every compressor must have a cable connecting it to another compressor. One less cable than the number of units sequenced must be used.

2. Each board that has only one cable connected to it must have its pigtail plugged into the unused jack. All installations will have two such units.

Program all members of the system, as described in the programming procedure on previous pages. All adjustments should be identical for each member, except for unit number. The sequencing system will make any necessary adjustments to the setpoints to properly run the compressed air system.

Operation - Refer to adjustments, and program each unit for sequence operating mode. Press the [RUN] key on each of the compressors to start operation of the sequenced system. Once this is done, the member controllers will operate the compressor units as required to maintain the plant pressure between the programmed Unload and Load Pressures, for average demands from 0 CFM up to the capacity of the system.

While operating, each controller will display a sequence number. As demand requires, the units will start and load in order, starting with sequence number 1 (lead unit). As demand falls, the higher sequence number units (lag units) will modulate, unload, and stop.

If any member of the system is taken out of sequence mode for any reason, other units with higher sequence numbers will automatically promote as required. Sequence numbers will start with 1, and will be assigned on other units up to the number of compressors in the system. This feature makes the system completely tolerant of any manual or protective stopping of any member.

ESTABLISHING THE INITIAL SEQUENCE

The first member compressor placed into sequence mode will become the lead unit. However, since any controller first placed into sequence has no way of knowing whether or not other members already exist, it will first assume the highest rotation number available. For example if the number of units to be sequenced is programmed at four, any compressor will start out in position four when placed in sequence mode. It will then listen for other units on the communications line.

If there is no member with the next lower sequence number, the controller will automatically promote itself. This movement is fairly rapid with the controller, and the number will advance to the lowest vacant position in several seconds.

To establish a desired order of units, press [STOP/RESET] on each compressor to remove it from the system. Then put the desired lead unit back into sequence. Wait until it promotes one step (or longer), then put the desired #2 unit into sequence mode and wait until it promotes one step, and so forth until all units are back into the sequence mode.

During this procedure, the system is not deprived of air. This is due to one of the outstanding features of the sequencing system: control is always executed locally by each member controller. So while controllers count down towards the final order, they are also operate their compressor and will deliver air. Once the sequence order is finally established, setpoints will continue to be adjusted in each member to provide operation in the preferred order. This may take several minutes after a manual change of sequence numbers.

AUTO SENTRY RS2000 SEQUENCE SYSTEM OPERATION

Each member compressor in the system operates similarly to the Automatic mode of operation. It will start, load, unload, blowdown, and automatically stop as necessary to meet system demand for air. There are several differences, however, when running in the Sequence mode.

The pressure shown on the top line of the display is the average system pressure of all the members. Each member communicates its local pressure through the communications cable, for use by others in the system for display and control. The system responds to this average. This number will be the same for all units in the system. To obtain the local package discharge pressure, select the "DIS PRESS" alternate display on the lower line.

Pressure setpoints are continuously adjusted, depending on the operation of the members. The last lag unit which is loaded will control its load and unload points to keep the system pressure within the programmed pressure band, and serves as the trim machine. Any running lead unit will be adjusted for slightly higher pressures, and will run at or near capacity. The first unloaded lag unit will have its load pressure adjusted so it will come on line if the system pressure drops to the programmed Load Pressure. The system is continuously adjusted to maintain the system pressure between the programmed pressures.

If any lag unit is loaded, any preceding lead unit will be loaded. Its blowdown timer will reset and hold at full value. This ensures that the last lag unit will always be the first to unload and blow down, and lead units will be prepared to handle the demand.

When demand exceeds the capacity of the loaded lead compressor(s), the pressure will drop. If a lag unit is stopped, its restart will be delayed. This delay is the adjustable "Lag Start Delay". This allows time for lead units and stored air to serve intermittent demands, without starting another compressor. The next available member accumulates any time spent below the programmed Unload Pressure, and will start whether there are repeated brief demands or a sustained demand. The Lag Start Delay timer does not begin timing until the preceding member of the system is loaded.

SEQUENCED SYSTEM CHECKOUT

One of the best indicators of the stability of the system is to compare the local system pressure of a running unit with the system average pressure. To do this, simply press the [<] or [>] cursor keys until the lower line of the display shows DIS PRES and the local pressure. In a properly operating system, this value will be within 1-2 psi of the top line value, and will change only as delivery changes. Rapid and large changes in local pressure indicate system problems. Ensure that all compressor units are piped to a common system pressure with adequate storage to handle the plant demands. Select other operating modes if rapid response to large demand changes is needed.

The system is redundant, and will tolerate any breakdown in communications. If any unit is taken out of the Sequence mode, other members will "fill the gap" to keep the system operating. If a break should occur in the communications cable, the compressors will continue to function as two systems, one on each side of the break. Each will have its own lead unit (Seq 1) and may have lag units (depending on how many controllers are on that side of the break). Look for a cable break if there are multiple units with the same Sequence number displayed.

Each controller also monitors the communications data for errors. If these occur, the yellow advisory will come on, and the controller displays a message to check the communications port. If this message comes on, and one member changes to "AUTO" operation, then it has been mistakenly programmed with the same Unit Number as another member. Refer to the sequence adjustments in the programming and setup instructions above.

Automatic Rotation - A controller will be the lead compressor for the time programmed as TRANSFER INTERVAL. Then it assigns itself the highest available rotation number. The lag compressors detect the

loss of the lead unit and decrement their rotation numbers. Number 2 becomes number 1, the new lead unit, number 3 becomes number 2, etc. The former lead unit will become the last lag unit.

The transfer interval timer operates whenever a member is the lead (Seq 1) unit of the system. It will continue to time out regardless of other units in the system. The remaining time is retained during power interruptions. It is reset back to full value if the controller is in any mode other than Seq 1.

Other Sequencing Features - Any air system will exhibit pressure differences from one point to the next. Even a well designed multi-compressor installation will show 'minor' pressure variations between one compressor's discharge point and another compressor's discharge. These points will also vary from the actual system storage (normally the air storage receiver). The sequencing system is designed to tolerate minor variations. The sequencing system will automatically adjust the system setpoint to maintain the average system pressure. Overpressures within any member compressor are prevented locally, and other members will load up to meet the demand. The dynamic setpoint control is completely automatic and is continuously adjusted.

If airflow is restricted between the compressor units and the common storage, the 'minor' variations described above become more significant. The pressure in the receiver will always be lower than that sensed by the compressor system. The system will tolerate this, and will still maintain the average pressure within limits. These restrictions may spread loading and unloading over several units, rather than showing the strong preference to unload only the last loaded lag unit.

The Lag Start Delay timer of any member does not begin timing until the preceding member of the system is loaded. This is particularly useful when starting up the system, as compressors will be started one at a time. This sequenced starting also happens if the members are controlled by their remote inputs. If programmed for automatic restart after power failure, the lead unit will be delayed by the automatic restart delay, then each additional unit will be delayed by the lag start delay.

If automatic restart is enabled in a sequenced system, set all of the restart delay timers to the same value. All controllers will then resume the same sequence numbers which they had prior to the interruption. The sequence controls will start the lead unit after the start timer countdown, and add units individually as required, based on the lag start delay.

CONNECTION TO OTHER "AUTO SENTRY" CONTROLLED COMPRESSORS

The controller offers capabilities to communicate with other Gardner Denver compressors in a sequenced system. Although the system ideally consists of a group of identical machines, there are some instances where a mixed group may provide acceptable service.

When building a system with other units with "AUTO SENTRY ES+" controllers, set the "AUTO SENTRY RS2000" for sequencing at the same baud rate as the larger controllers. Set all the companion ES+ units for “LOAD-UNLOAD” operation. This will provide all of the performance described above.

Systems with mixed compressors are generally better served by splitting the system into two independent parts. Each part should consist of a single compressor or a group of peer units, adjusted for the desired operation.

CONNECTION TO EXTERNAL CONTROLS

The "AUTO SENTRY RS2000" controller offers interconnection points for external controls and indicators. This allows simple connection to remote controls and indicators, or integration into any plantwide controls system.

Remote On / Off - Remote on-off control of the system requires only a simple two-wire control, with an isolated contact suitable for 120 volts, 1 amp. This may be a switch, a timer contact, a relay contact, or a PLC output. To connect, simply run the two wires to the control enclosure, remove the jumper between terminal 5 and terminal 9 on the terminal strip, and connect the two wires to terminal 5 and terminal 9.

The air compressor will operate normally in its selected mode whenever this contact is closed (turned on). Note that the keypad is always the master control; the operating mode must be selected at the keypad, and the remote is not capable of starting a unit after the [STOP/RESET] key has been pressed to place the controller in the READY state. When the contact is opened (turned off), operation depends on how the controller has been programmed and what it is doing prior to opening the contact.

If the compressor was already stopped in automatic or sequence modes, it will remain stopped and will not restart until the contact is closed. The display will flash the message "REMOTE HALT" to indicate that it is waiting for the remote signal.

If the compressor was running in any mode when the contact was opened, and the remote response is programmed for "IMMEDIATE", the compressor will immediately unload, and will run only until the reservoir is blown down. Then the motors stop, and the unit will be in the "REMOTE HALT" mode as indicated above.

If the compressor was running in any mode when the contact was opened, and the remote response is programmed for "TIMED UNLOAD", the compressor will immediately unload and blowdown. It will then continue to run unloaded for whatever period has been programmed for "AUTO TIME" (or will complete the remaining auto time if already blown down). The controller displays "REMOTE UNLOAD" during this period. After completion, the motors will stop, and the unit will be in the "REMOTE HALT" mode as indicated above.

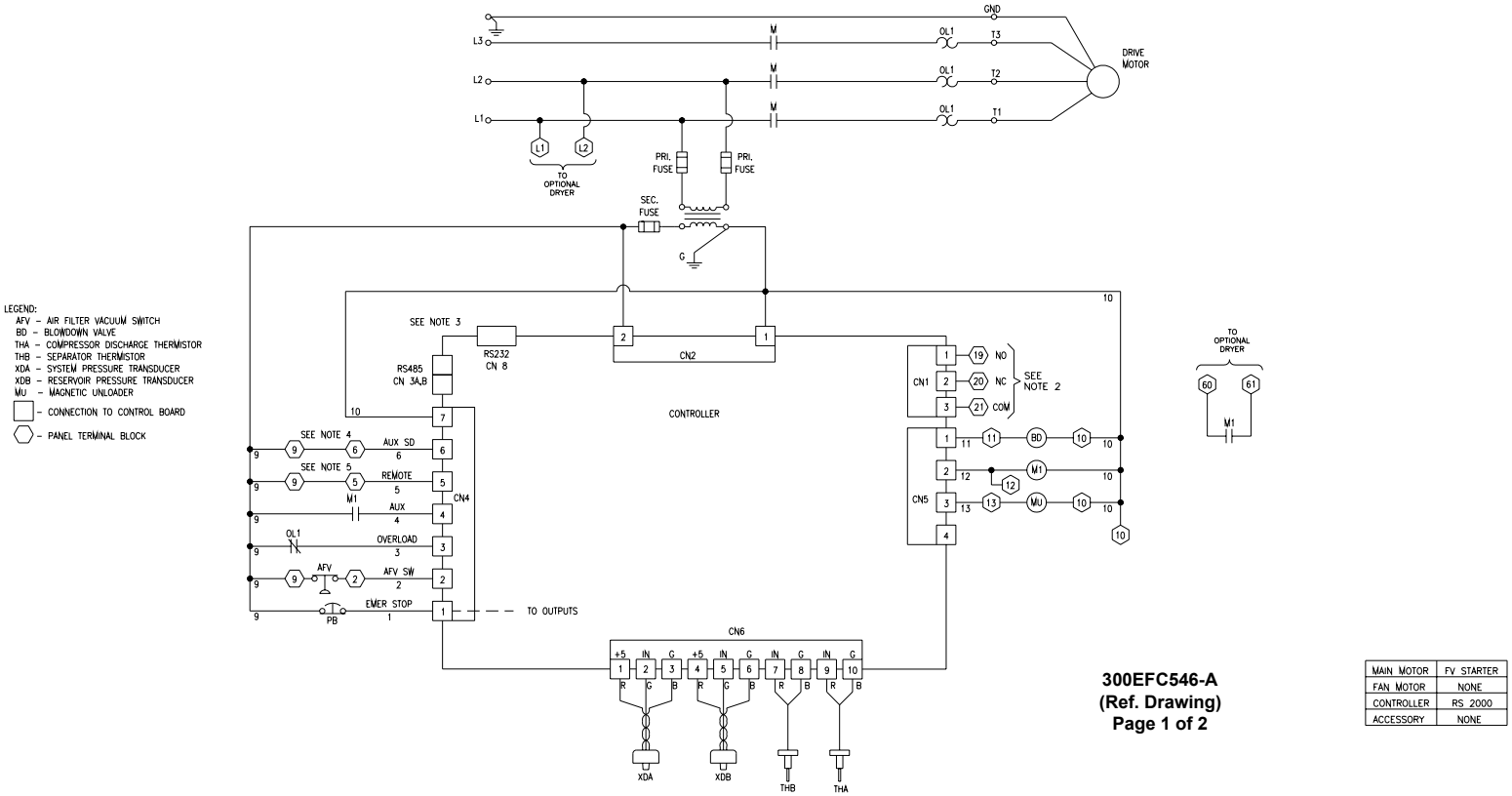
When the remote is turned back on, the unit will start immediately in the CONSTANT or LOW DEMAND modes. Loading in these modes, or starting in AUTO or SEQUENCE modes will occur when the pressure drops below the load pressure.

Alarm Relay - The controller is provided with an alarm relay which may be connected to a remote mounted indicator light, horn, or into a PLC input of a plantwide control system. The contact is commercial rated 2 amps at 120 volts. The relay is turned on whenever there is a SHUTDOWN condition requiring service at the compressor, and remains off during normal operation, stopping, or power off conditions. The external connections from the controller are from an isolated form C (single-pole, double-throw) contact. This allows control of either a "compressor okay" or a "compressor shutdown" remote indicator.

To use this relay, connect the supply wire for the remote circuit to terminal 21 (relay common) on the terminal strip. Connect a wire to the indicator from either terminal 19 (normally open) or from terminal 20 (normally closed). Connect the other side of the indicator to its neutral.

Serial Communications - The RS-232 port is available for serial communications of compressor data to external monitoring systems at any time. If units are NOT connected in sequence, the RS-485 port may be used for multi-drop communications of compressor data to external monitoring systems. Data available include all pressures and temperatures, and a report of internal service data. This is accessible with a PC or PLC with an appropriate communications port. For protocol information, request drawing 303EBC1255.

Wiring Diagrams - The following wiring diagrams show connections in typical units. Refer to the wiring diagram shipped with the compressor unit for actual connections.



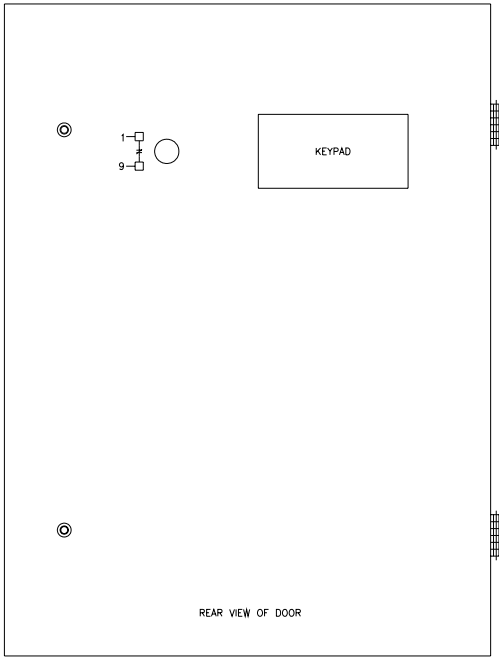
300EFC546-A
(Ref. Drawing)
Page 1 of 2

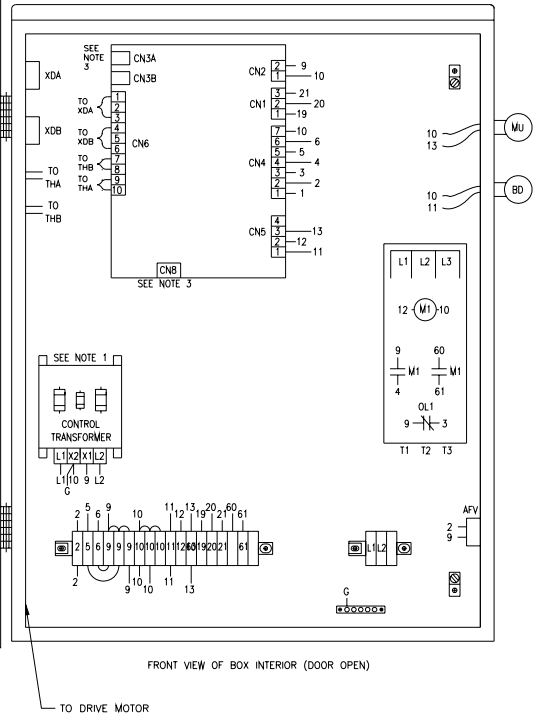
MAIN MOTOR	FV STARTER
FAN MOTOR	NONE
CONTROLLER	RS 2000
ACCESSORY	NONE

Figure 3-2 – TYPICAL WIRING DIAGRAM – V4.xx

WIRING DIAGRAM

NOTE 1: REFER TO CONTROL TRANSFORMER DECAL FOR WIRING CONNECTIONS.
NOTE 2: FORM C CONTACT FOR USE BY OTHERS. CONTACT OPERATES FOLLOWING COMPRESSOR SHUTDOWN. RATING: 120VAC, 2 AMP.
NOTE 3: CN3A, CN3B AND CN8 ARE FOR USE OF OPTIONAL COMMUNICATIONS CABLE.
NOTE 4: FOR USE WITH OPTIONAL SHUTDOWN SWITCH, REMOVE JUMPER BETWEEN TERMINALS 6 & 9. CONNECT N.C. SWITCH CONTACT TO TERMINALS 6 & 9.
NOTE 5: FOR CONTROL BY REMOTE CONTACT, REMOVE JUMPER BETWEEN TERMINALS 5 & 9. CONNECT CONTACT TO TERMINALS 5 & 9.





FRONT VIEW OF BOX INTERIOR (DOOR OPEN)

300EFC546-A
(Ref. Drawing)
Pag 2 of 2

SECTION 4
VERSION 6.xx INSTRUCTIONS

OPERATING MODES

Version 6 software provides two operating modes, suitable for internal or remote control of compressor delivery. While operating, the active mode is displayed in the lower right corner of the message window.

Automatic Mode Operation - This mode provides automatic start and timed stop. It provides fast response for small air systems, or power savings in applications with long unloaded periods and adequate storage to allow the compressor to be stopped for periods of light demands. The display will indicate this as “AUTO”.

Whenever the plant pressure drops below the programmed “load pressure”, the controller responds by starting the compressor motor (if it was stopped) and loading the compressor to deliver air at full capacity. When the pressure rises to the “unload pressure”, the controls unload the compressor, and it no longer delivers air to the plant system. This cycle repeats, and the controller maintains the pressure within the programmed band.

If the load and unload cycles are frequent, the controls maintain pressure within the air/oil reservoir to prevent loss of compressed air. The compressor will reload at the middle of the programmed pressure band.

A blowdown timer in the controller comes into effect with moderate air storage and longer load and unload cycles. This timer starts whenever the compressor is initially loaded, and prevents blowdown of the reservoir. If it has timed out, the reservoir will then be vented during an unload cycle. This reduces power consumption while the plant continues to operate with its stored compressed air. The timer is adjustable from 1 to 20 minutes.

A second timer provides additional savings with large storage of plant compressed air. The automatic time delay is adjustable from 1 to 20 minutes. If the controller operates unloaded for this period with no demand, the compressor drive motor is halted to eliminate its power consumption. The controls will remain in this state until pressure drops below the load pressure.

Remote Mode Operation - This mode may be used to control compressor operation with external controls.

When used without external loading controls, this provides a convenient means to disable automatic operation with an external switch, timer, or plant control system. When used with external loading controls, compressor loading and unloading points are determined by an external contact. The display will indicate “REM” while in this mode.

PROGRAMMING AND SETUP FOR THE "AIRPILOT+" CONTROLLER

Programming and setup is accomplished with the PROGRAM keys. See Figure 1-1, Keypad. In all steps, the [ENTER] key enters the displayed value into memory and advances to the next programming function. The plus [+] and minus [-] keys will increase and decrease displayed numeric values, or step through menu selections. During numeric adjustments, the left [<] and right [>] arrow keys, move the cursor (flashing digit) to the position desired. Use the [+] and [-] keys to change the number at the cursor. At any point in the programming and setup routine, the [STOP/RESET] key can be pressed to exit the adjustment mode without altering the adjustment. In all steps of the programming routine, the top line of the display will give a description of the parameter to be programmed, while the bottom line shows the variable that may be altered or stored.

The following is a step by step guide to programming the "AIRPILOT+". Remember, between each step, it is necessary to press the [ENTER] key to store the new value and advance to the next step.

Main Adjustments Menu

1. The compressor must be stopped prior to making any adjustments. If the unit is running, press the [STOP/RESET] key to place the control in the "READY" state.

   Adjustments can also be performed from the "SHUTDOWN" state. After adjustments are completed, the controller returns to this state until the cause is repaired and the controller is manually reset.

2. Press the [ENTER] key to begin programming. This enters the adjustments menu. The adjustments are broken into five groups as shown in Figure 4-1. To select a group, press [+] or [-] until the desired group is shown on the bottom line of the display. Press [ENTER] to proceed to the group adjustments detailed below.

Operation Adjustments

1. In the top line, "LANGUAGE" is indicated. The bottom line will indicate "ENGLISH" or an alternate language for display messages. Select the desired display language and press [ENTER] to proceed.

   If a controller is set for another language, press the [STOP/RESET] key, press [ENTER] twice, and press the [+] or [-] key to select ENGLISH at this step. Then press [ENTER] to select the language.

2. In the top line, "DISPLAY UNITS" is indicated. The bottom line will indicate "ENGLISH" (PSIG, Fahrenheit) or "METRIC" (Bars, Celsius) units of measurement. Select the desired display units and press [ENTER] to proceed.

3. In the top line, "START TIMER" is displayed. The bottom line will indicate a time between 2 and 10 seconds. This is the time that the controller spends in the unloaded 'start' mode. This also controls the operation of package-mounted wye-delta starters, if so equipped. Set this adjustment for the amount of time needed for the motor to reach its highest speed while starting. This is typically 3 seconds for full-voltage starters, 7-9 seconds for wye-delta starters.

   If a remote-mounted, reduced voltage starter is used, set this adjustment 1-2 seconds longer than the starter's internal timer.

4. "UNLOAD PRESSURE" is displayed and adjusted next. The bottom line will indicate a pressure value. It is to be set at the nameplate rating of the compressor for normal operation. Under NO circumstances, is this adjustment to be set in excess of the compressor nameplate pressure. It may be set lower, if desired, to reduce pressure and power consumption.

5. In the top line, "LOAD PRESSURE" is displayed. The bottom line will indicate a pressure value. This setting determines the point at which machine startup occurs in AUTO mode and when the compressor will load up from the blown down condition. Note that LOAD PRESSURE can be set up to 5 PSI below UNLOAD PRESSURE. Set this lower to reduce compressor cycling.

6. In the top line, "BLOWDOWN TIME" is displayed. The bottom line will indicate a time between 1 and 20 minutes. It is factory set at 10 minutes. This is the minimum time interval between blowdowns. A longer blowdown time minimizes wasteful dumping of compressed air when loading is likely to occur in a short time.

7. In the top line, "AUTO TIME" is displayed. The bottom line will indicate a time between 1 and 20 minutes. It too, is factory set at 10 minutes. Its function is to prevent too frequent motor starting, and to allow the motor a 'cool-down' period before stopping.

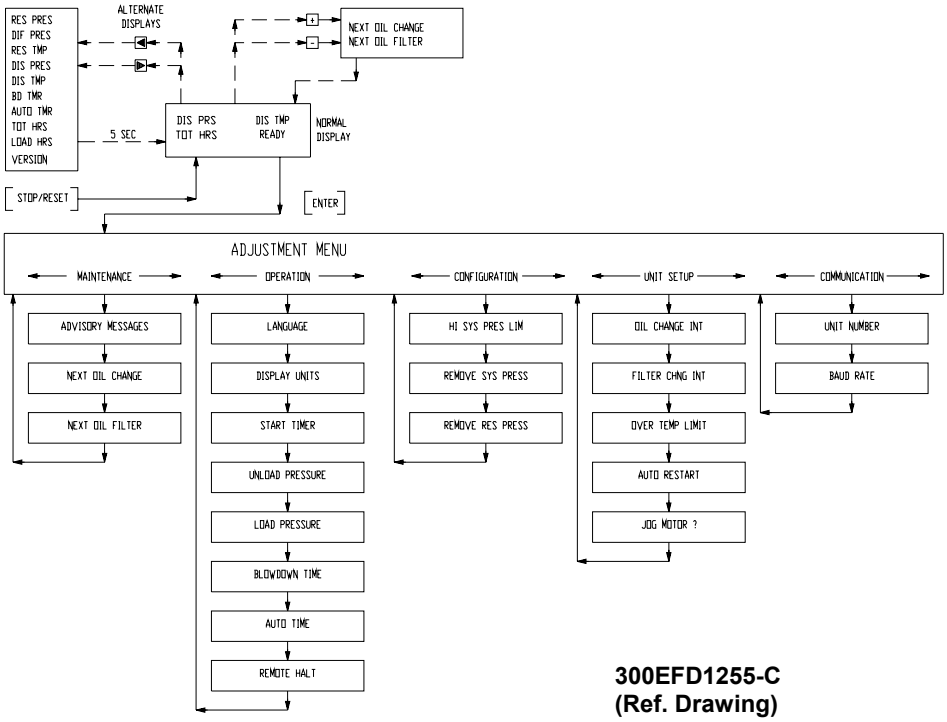


Figure 4-1 – FLOW CHART FOR SETUP PROGRAMMING – V6.xx

8. In the top line, "REMOTE HALT" is displayed. The bottom line indicates either "TIMED" or "IMMEDIATE". Refer to the description of "Load/Unload" later in this section for additional details. Select the desired response to the remote input and press [ENTER] to proceed.

9. This completes the operational adjustments. The controller will return to the main adjustments menu.

Maintenance Adjustments

1. If any service advisories are in effect (yellow ADVISORY indicator is on), they will be displayed on the top line. The bottom line indicates "LEAVE ADVISORY" (do not reset) or "CLEAR ADVISORY" (turn it off). Select the desired action and press [ENTER] to proceed.

   Note that both the "CHANGE OIL" and "CHANGE OIL FILTER" advisories are based on operating time. These timers are not automatically reset on the controller when the advisory is turned off, and the advisory will come back on shortly after the unit starts running. If the oil or filter has been changed, clear the advisory as noted above, then proceed to the following steps to reset the appropriate timer back to its full value.

2. The top line displays "NEXT OIL CHANGE" and the estimated hours remaining are displayed on the bottom line. The actual time will be affected by operating conditions which affect oil life. Press the [+] or [-] keys to switch to the oil change interval (see UNIT SETUP) if service was performed early. Press again to change back to remaining time. When the desired value is shown, press [ENTER] to save and proceed to the next step.

   If the advisory message is on, it must be cleared as noted in step 1.

3. The top line displays "NEXT OIL FILTER" and the hours remaining are displayed on the bottom line. Press the [+] or [-] keys to switch to the oil filter interval (see UNIT SETUP) if service was performed early. Press again to change back to remaining time. When the desired value is shown, press [ENTER] to save and proceed.

   If the advisory message is on, it must be cleared as noted in step 1.

4. This completes the maintenance adjustments. The controller will return to the main adjustments menu.

Communications Adjustments

Adjustment is needed only if required for serial data communications systems, and does not affect operation.

1. In the top line, "UNIT NUMBER" is displayed. The bottom line will indicate a number of one through eight and be factory set at "1". Enter a different number for each controller in a multiple compressor system.

2. The controller displays "BAUD RATE" on the top line, and a selection of "1200" or "9600" on the lower line. 1200 baud is recommended for most applications. The 9600 baud rate may be used for higher data transfer rates. All units in a multiple compressor system must be set the same. Select the desired value, and press [ENTER].

3. This completes the communications adjustments. The controller will return to the main adjustments menu.

Configuration Adjustments

1. In the top line, "HI SYS PRES LIM" is displayed. The bottom line will indicate a value that is factory set 20 - 25 PSI above name plate. This is the pressure that will cause a shutdown if exceeded due to a malfunction such as a stuck inlet valve or broken control line. This should be set at or slightly below the rating of the pressure relief valve. The controller will attempt a number of actions as it approaches to prevent the pressure from reaching this limit.

NOTICE
The controller will automatically adjust the set and reset pressures as required if this limit is lowered.

2. In the top line, "REMOVE SYS PRESS" is displayed. The bottom line displays the current pressure being sensed at the package discharge. At this point, steps must be taken to ensure that system pressure is, in fact, zero psig. Remove the pressure line to the system pressure transducer. Pressing [ENTER] will now cause the controller to calibrate the transducer output to zero PSIG.

Obviously, pressure measurement errors will be encountered if 'zeroing' is done with pressure at the transducer. If large errors are detected, the controller will demand that the transducer be checked.

3. In the top line, "REMOVE RES PRESS" is displayed. The bottom line displays the current pressure being sensed in the reservoir. The reservoir pressure transducer may now be 'zeroed' by following the steps outlined in step 2 above.

4. This completes the configuration adjustments. The controller will return to the main adjustments menu.

Unit Setup Adjustments

1. In the top line, "OIL CHANGE INTERVAL" is displayed. The bottom line will indicate a time interval of 1000 to 12000 hours. After the machine has run for the programmed setting, an advisory will be displayed, requesting an oil change. Adjust as desired and press [ENTER] to proceed.

2. In the top line, "FILTER CHNG INTERVAL" is displayed. The bottom line will indicate a time interval of 500 to 1200 hours. After the machine has run for the programmed setting, an advisory will be displayed, requesting an oil filter change. Adjust as desired and press [ENTER] to proceed.

3. In the top line, "OVER TEMP LIMIT" is displayed. The bottom line will indicate 225 degrees F. This is the proper setting for compressor operation with conventional coolant. It may be set higher for high temperature oils, per the manufacturer's instructions. It may be temporarily lowered to verify the function of the temperature shutdown system.

4. In the top line, "AUTO RESTART" is displayed. The bottom line will indicate either "OFF" or "ON". The factory setting is "OFF", and the controller will display a power failure shutdown after power has been restored.

   Set this feature to ON when it is necessary to have the compressor automatically restart after a power interruption. There will be a brief delay, then the control resumes the mode it was in prior to the interruption. This feature shall only be enabled when the owner determines that it is safe to do so. It is recommended that compressor access be limited to only trained service personnel when this feature is used.

5. This step is only encountered if the AUTO RESTART function was set to ON in the previous step. In the top line, "RESTART DELAY" is displayed. The bottom line will indicate a time between 5 and 30 seconds. It is factory set at 10 seconds. This is the amount of delay introduced before restarting after power has been restored. Set it as desired to allow time for power to stabilize before starting compressors.

6. The display now reads "JOG MOTOR?" and indicates the amount of time to energize the starter. Adjust with the [+] or [-] key to the smallest value needed to bump the motor and check rotation. 0.1 to 0.2 seconds is normally adequate for factory-furnished full-voltage starters; wye-delta or remote starters may require a little more time. Set back to zero to proceed to the next step.

7. This completes the unit setup adjustments. The controller will return to the main adjustments menu.

CONNECTION TO EXTERNAL CONTROLS

The controller offers interconnection points for external controls and indicators. This allows simple connection to remote controls and indicators, or integration into any plantwide controls system.

Local/Master - Remote control enabling of the compressor requires only a simple two-wire control, with an isolated contact suitable for 120 volts, 1 amp. This may be a switch, a relay contact, or a PLC output. To connect, simply run the two wires to the control enclosure, and connect the two wires to terminals 6 and 9.

The air compressor will operate normally in automatic mode whenever this contact is open (turned off). All operating functions will be based on its local, internal pressure sensors.

Whenever the contact is closed (turned on), the operation of the compressor is governed by the “load-unload” input described below. The compressor’s internal controls will continue to be used for protective functions and service information. While in the remote mode of operation, all normal loading and unloading is controlled by the Load/Unload input, rather than internal controls. The display will indicate the operating mode as “REM” while in remote mode.

This input may be used for a remote disable, by simply leaving the load/unload input off. The compressor will run normally whenever Local/Remote is on, and will stop whenever Local/Remote is off.

Load/Unload - Remote loading and unloading of the compressor requires only a simple two-wire control, with an isolated contact suitable for 120 volts, 1 amp. This may be a switch, a relay contact, or a PLC output. To connect, simply run the two wires to the control enclosure, and connect the two wires to terminal 5 and terminal 9. This input is considered only when enabled by the Local/Remote input.

The compressor controls will load the compressor when this contact is closed (turned on). This includes and necessary steps to start the package. It will continue to deliver its full capacity, unless protective functions take effect. When the contact is opened (turned off), operation depends on how the controller has been programmed and what it is doing prior to opening the contact.

If the remote response is programmed for "IMMEDIATE", the compressor will immediately unload, and will run only until the reservoir is blown down. Then the motor stops, and the controller displays "REMOTE HALT" until once again commanded to load.

If the remote response is programmed for "TIMED UNLOAD", the compressor will immediately unload and blowdown. It will then continue to run unloaded for whatever period has been programmed for "AUTO TIME". The controller displays "REMOTE UNLOAD" during this period. After completion, the motors will stop, and the unit will be in the "REMOTE HALT" mode as indicated above.

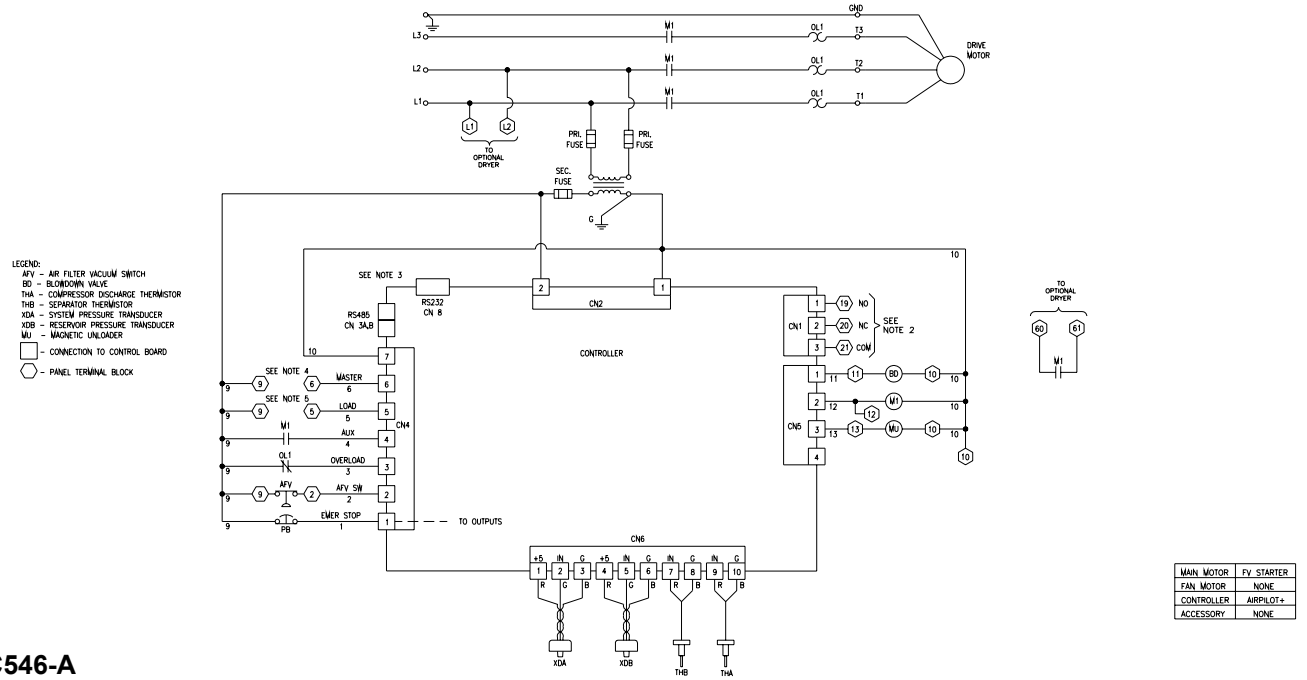
If the Load/Unload contact closes while any timed periods are in effect, the controls will immediately proceed to load up the compressor. If the Local/Remote contact opens during any of this operation, the controls simply automatically assume controls as necessary, based on the local sensors.

Compressor Available Relay - The controller is provided with a relay which may be connected to a remote mounted indicator light, or into a PLC input of a plantwide control system. The contact is commercial rated 2 amps at 120 volts. The relay is turned on whenever the controls are in AUTO or REM mode, and the compressor is available to the system. The relay is turned off if the compressor is manually stopped, if there is a protective shutdown, or if power is removed. The external connections from the controller are from an isolated form C (single-pole, double-throw) contact. This allows control of either a "compressor available" or a "compressor unavailable" remote indicator.

To use this relay, connect the supply wire for the remote circuit to terminal 21 (relay common) on the terminal strip. Connect a wire to the indicator from either terminal 19 (normally open) or from terminal 20 (normally closed). Connect the other side of the indicator to its neutral.

Serial Communications - The RS-232 port is available for serial communications of compressor data to external monitoring systems at any time. The RS-485 port may be used for multi-drop communications of compressor data to external monitoring systems at any time. Data available include all pressures and temperatures, and a report of internal service data. This is accessible with a PC or PLC with an appropriate communications port. For protocol information, request drawing 301EFD1255.

Wiring Diagrams - The following wiring diagrams show connections in typical units. Refer to the wiring diagram shipped with the compressor unit for actual connections.



MAIN MOTOR	FV STARTER
FAN MOTOR	NONE
CONTROLLER	AIRPILOT+
ACCESSORY	NONE

303EFC546-A
(Ref. Drawing)
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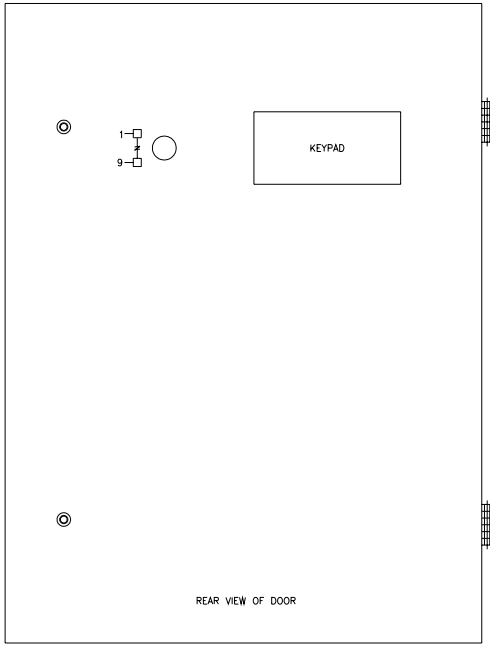
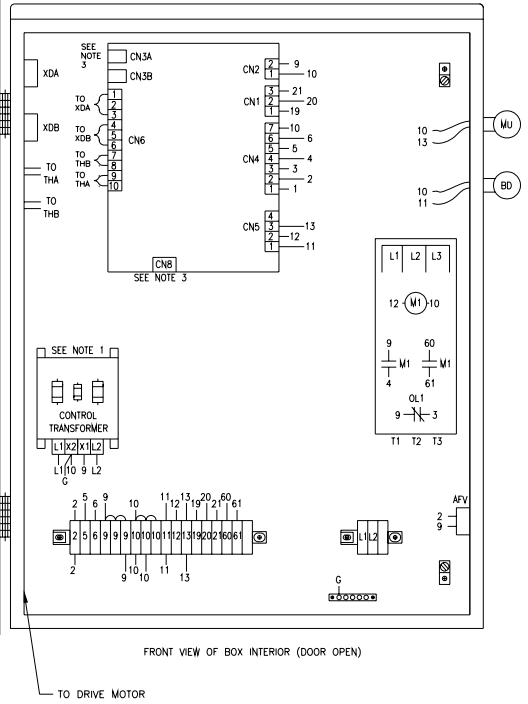
FIGURE 4-2 – TYPICAL WIRING DIAGRAM – V6.xx

303EFC546-A
(Ref. Drawing)
Page 2 of 2

NOTE 1: REFER TO CONTROL TRANSFORMER DECAL FOR WIRING CONNECTIONS.
NOTE 2: FORM C CONTACT FOR USE BY OTHERS. CONTACT OPERATES WHENEVER THE COMPRESSOR IS IN AN OPERATING MODE. RATING: 120VAC, 2 AMP.
NOTE 3: CN3A, CN3B AND CN8 ARE FOR USE OF OPTIONAL COMMUNICATIONS CABLE.
NOTE 4: MASTER INPUT IS FOR USE WITH EXTERNAL CONTROLS. WHEN OPEN, THE COMPRESSOR OPERATES NORMALLY WITH LOCAL CONTROLS. WHEN CLOSED, OPERATION IS CONTROLLED BY THE LOAD INPUT.
NOTE 5: LOAD INPUT IS FOR USE WITH EXTERNAL CONTROLS ENABLED BY THE MASTER INPUT. WHEN CLOSED, THE COMPRESSOR WILL START AND LOAD TO FULL CAPACITY. WHEN OPENED, THE COMPRESSOR WILL UNLOAD AND STOP.





SECTION 5
TROUBLESHOOTING

AUTO SENTRY CONTROLLER
DISPLAY MODES

The normal display indicates the package service pressure, the airend discharge temperature, the total running hours, and one of the following operating modes. The green run light will be on for any operating mode, whether the compressor is running or not.

READY	The compressor has been stopped by pressing the [STOP/RESET] key
AUTO	The compressor is operating in the Automatic mode
CON	The compressor is operating in the Constant Run mode
LDM	The compressor is operating in the Low Demand mode
SEQ n	The compressor is operating in the Sequence mode
REM	The compressor is operating in the Remote mode

The following alternate displays may be called by pressing a cursor [<] or [>] key

RES PRES	The pressure in the oil reservoir
DIF PRES	The pressure drop across the separator
RES TMP	The temperature at the separator
DIS PRES	The pressure at the service connection
DIS TMP	The temperature at the airend discharge
BD TMR	The time remaining before a blowdown will be allowed
AUTO TMR	The time remaining of unloaded motor operation
TOT HRS	The total hours of compressor running
LOAD HRS	The hours of compressor delivery
NAME & VERSION	The name and version of operating software

The following alternate displays may be called by pressing the [+] or [-] key

NEXT OIL CHANGE	The estimated remaining time until the next recommended change
NEXT OIL FILTER	The remaining time until the next recommended filter change
MESSAGE	List of any recommended service messages

ADVISORY TROUBLESHOOTING GUIDE

All advisories are indicated on the keypad by a yellow indicator in the Status area, and one of the following messages alternating with the normal lower line display. Perform service or maintenance as indicated, then clear the advisory as instructed in the operating instructions.

Message	Action Needed
CHECK COMM PORT	The controller has detected a communications problem while running in Sequence mode. Check for proper cable installation. If the controller switches from Sequence to Auto mode, reprogram a different unit number. (V4.xx only)
CHNG AIR FILTER	Excessive vacuum has been detected after the air filter, indicating it has become full. Change the air filter to ensure maximum air delivery.
CHANGE SEPARATOR	The differential pressure across the separator has risen to over 8 psid. Change the separator to ensure peak compressor performance.
CHNG OIL FILTER	The unit has been operated for the programmed number of hours since the last filter replacement. Change the filter to ensure an adequate flow of lubricant.
CHANGE OIL	The unit has been operated for the programmed number of hours since the last oil change. Change the oil to ensure lubricant quality.
HIGH DISCH TEMP	The temperature was greater than 210 degrees F (99 degrees C) at the airend discharge. Ensure that the compressor receives adequate cooling air or water, and that the coolers are not plugged.
HIGH RESRVR TEMP	The temperature was greater than 210 degrees F (99 degrees C) at the separator. Ensure that the compressor receives adequate cooling air or water, and that the coolers are not plugged.
LOW AMB TEMP	The temperature was less than 40 degrees F (4 degrees C) at: (A) the airend discharge, (B) the separator. Ensure that the compressor is located in a room kept above freezing.

SHUTDOWN TROUBLESHOOTING GUIDE

All shutdowns are indicated on the keypad by the word "SHUTDOWN" on the top line of the display, and one of the following messages on the lower line of the display. The red indicator in the Status area will be steadily lit while the condition exists, and will flash after the condition has been corrected. Perform service as indicated. Press the [STOP/RESET] key to clear the shutdown.

Message	Action Needed
CHANGE SEPARATOR	The differential pressure across the air / oil separator has risen to over 15 psid. Change the separator to ensure maximum compressor performance.
CHECK CN6	All inputs at connector 6 of the controller are off. The most common cause for this is that the connector plug has been pulled out. Plug the connector back in firmly.
CHECK CN4	120 volts has been removed from ALL inputs to connector 4 of the controller. The most common cause for this is that the connector plug has been pulled out. Plug the connector back in firmly. This may also indicate a poor neutral (white wire) connection to connector 4.
CONTROLLER ERROR	The controller performs several internal diagnostic checks of its own operation. Follow instructions on lower line, or replace if the controller indicates "REPAIR REQUIRED".
EMERGENCY STOP	The Emergency Stop button has been pressed. Pull it back out to its normal position. If the button has not been pressed, check that the contact block is firmly mounted in the right or left (not center) position of the operator. Check for loose connections which would remove 120 volts from connector 4-1 of the controller.
EXTERNAL DEVICE	120 volts has been removed from terminal 6 of the terminal strip. This is normally shipped jumpered directly to terminal 9, but the jumper may be removed to add a field installed shutdown switch. Reset the external switch. (V4.xx only)
HI SYSTEM PRESS	Pressure in excess of the programmed high pressure limit has been detected. The most likely cause is other, higher pressure compressors on the same air system; separate these from this compressor unit. Other possible causes are loose connections to the transducer, electrical noise and transients, or improper setting of the high pressure limit.
HIGH DISCH TEMP	This indicates that the controller has detected temperature in excess of the programmed high temperature limit at the airend discharge. The most common cause for this is inadequate package cooling. Ensure proper air flow for aircooled units, or adequate cooling water for water cooled units. Check for proper oil level, and fill as required. Monitor the temperature carefully during restarts after servicing.
HIGH DISCH TEMR	This indicates that the controller has detected a rapid temperature rise in the airend discharge. This normally would indicate a loss of coolant injection into the airend. Check oil level, and fill if required. Completely check all oil piping, the filter, and flow controls for blockage or freezing. This may also be caused by a loose connection at connector 6 of the controller. Monitor the temperature carefully during restarts after servicing.

Message	Action Needed
HIGH RESVR PRESS	Pressure in excess of the programmed high pressure limit has been detected. This shutdown will occur if a loss of pneumatic controls occurs. Check the inlet valve, all control piping, solenoid valves, and all other control devices to find the cause for the inlet valve not closing. Other possible causes are loose connections to the transducer, electrical noise and transients, or improper setting of the high pressure limit.
HIGH RESRVR TEMP	This indicates that the controller has detected temperature in excess of the programmed high temperature limit at the air / oil separator. The most common cause for this is inadequate package cooling. Ensure proper air flow for aircooled units, or adequate cooling water for water cooled units. Check separator element, replace non-standard separators with recommended separator. Monitor the temperature carefully during restarts after servicing.
HIGH RESRVR TEMR	This indicates that the controller has detected a rapid temperature rise in the air / oil separator. Use only recommended separators; replace non-standard separators. This may also be caused by a loose connection at connector 6 of the controller. Monitor the temperature carefully during restarts after servicing.
HIGH VIBRATION	120 volts has been removed from terminal 6 of the terminal strip. This is normally shipped jumpered directly to terminal 9, but the jumper may be removed to add a field installed shutdown switch. Reset the external switch. (V4.xx only)
LOW SUMP PRESS	The controller has attempted to start and load the compressor, but pressure is not building up in the oil reservoir. This may indicate either a failure of the motor to turn the compressor, or a failure of the inlet valve to open. If the latter, check also the wiring and piping to the magnetic unloader; this is turned on to load up the compressor.
LV RELAY	120 volts has been removed from terminal 6 of the terminal strip. This is normally shipped jumpered directly to terminal 9, but the jumper may be removed to add a field installed shutdown switch. Reset the external switch. (V4.xx only)
MAIN OVERLOAD	The overload relay for the main compressor drive motor, located within the electrical control box, has tripped. This indicates high motor shaft load, low voltage, or excessive imbalance in the incoming power (such as a blown fuse). Disconnect and lock out power, open the box, and press the reset button - it will click when reset. Measure motor amps, and take corrective actions to get all currents within the motor nameplate rating. Check that the programmed Load Pressure is at or below the compressor nameplate rating. If the overload relay has not tripped, check for the cause that 120 volts was removed from connector 4 - 3 of the controller.
MAIN STARTER	The controller has attempted to start the compressor, but did not receive a return signal from the starter's auxiliary contact. If the starter does not pick up when attempting to start, check that connector 5 of the controller is plugged in firmly, and check the starter coil. If the starter does pick up, but this message appears, check that the auxiliary contact block is properly installed on the starter and wired to connector 4, terminal 4.
MAIN STRT CONTCT	The controller has attempted to turn off the compressor, but is still receiving a return signal from the starter's auxiliary contact. Check that the starter operates freely and that the contact block is properly installed on the starter.

Message	Action Needed
MOTOR OVERTEMP	120 volts has been removed from terminal 6 of the terminal strip. This is normally shipped jumpered directly to terminal 9, but the jumper may be removed to add a field installed shutdown switch. Reset the external switch. (V4.xx only)
OPEN THERM	The controller has detected an open connection to thermistor: (A) airend discharge or (B) separator. This normally indicates a loose or broken connection at the controller connector 6; check and correct the connection. This could also be indicating a broken wire or thermistor probe, or exposure to excessively low temperatures.
OPEN XDUCER	Signal voltage has fallen too low at transducer: (A) final discharge or (B) reservoir. This probably indicates a loose connection of the red or green wire to the transducer or an unplugged transducer. If connections are good, this is indicating a defective transducer. Check connections, or replace transducer if necessary.
PHASE RELAY	120 volts has been removed from terminal 6 of the terminal strip. This is normally shipped jumpered directly to terminal 9, but the jumper may be removed to add a field installed shutdown switch. Reset the external switch. (V4.xx only)
POWER FAILURE	The power to the compressor unit has been turned off and back on. Press [STOP/RESET] and select an operating mode.
SHORTED THERM	The controller has detected a shorted connection to thermistor: (A) airend discharge or (B) separator. This normally indicates a faulty connection (e.g. wire strands touching) at the controller connector 6; check and correct the connection. This could also be indicating a damaged wire or thermistor probe.
SHORTED XDUCER	Signal voltage has exceeded approximately 4.6 volts at transducer: (A) final discharge or (B) reservoir. This may indicate a loose connection of the black wire to the transducer or a defective transducer. Check connections, or replace transducer if necessary.
WATER PRESS	120 volts has been removed from terminal 6 of the terminal strip. This is normally shipped jumpered directly to terminal 9, but the jumper may be removed to add a field installed shutdown switch. Reset the external switch. (V4.xx only)
ZERO XDUCER	Signal voltage has fallen too low at transducer: (A) final discharge or (B) reservoir. This error is usually the result of the transducers being improperly zeroed. Disconnect the air lines to the transducers and follow the procedure indicated in the adjustment instructions. This shutdown for transducer B may also be the result of reverse compressor rotation. Check connections, or replace transducer if necessary.

CONTROLS TROUBLESHOOTING GUIDE

The following are recommended service actions. Observe all instructions noted elsewhere in this manual. All electrical service is to be performed only by a qualified electrician.

Symptom	Recommended Action
No display, compressor stopped	Check incoming power to the compressor unit. Ensure that the disconnect is on and that fuses have not blown (or circuit beaker tripped). If power is being properly supplied to the control box, check the control transformer fuses, and the wiring to connector CN-2. Ensure that the ribbon cable is undamaged and plugged into both the controller and keypad.
Compressor will not start.	To operate, the controller must be placed into an operating mode (e.g.AUTO); press the [STOP/RESET] key to put the control into the READY state, then press [RUN] to begin operation. In AUTOMATIC mode, compressors will not start until the pressure drops below the load pressure.
Display indicates "NOT BLOWN DOWN"	The controller prevents attempts to start the main motor if the reservoir pressure is over 5 psig. Pressure continues to be relieved from the reservoir while this message is on, and the compressor will start automatically after the pressure has dropped. If this message remains with NO pressure in the reservoir, follow the transducer zeroing procedure found in the controls adjustment section.
Display indicates "REMOTE HALT"	The controller is provided with an input for user-furnished remote controls. This display indicates that 120 volt is removed from terminal 5 of the terminal strip. Check all connections of the factory installed jumper, or the customer- provided controls, if applicable. Refer to “Connection To External Controls” in Section 3 or 4, as appropriate.
Display indicates "SHUTDOWN"	If the display indicates "SHUTDOWN", refer to the shutdown troubleshooting section for assistance. In addition to the messages shown, there are several internal and system diagnostics performed by the controller. Consult the factory for additional assistance.
Compressor runs, but does not load	The controller loads the compressor when the pressure drops below load pressure. Refer to the operating instructions for further information. If pressure is below the load pressure, check that the inlet valve operates freely. Check that the magnetic unloader valve is wired and operating properly.
Compressor does not unload	The controller operates the inlet valve to maintain pressure near the programmed unload pressure, matching delivery to demand. If the pressure continues to rise above unload pressure, check that the inlet valve operates freely. If the operating mode on the display indicates “REM” (V6.xx only), check and repair the remote pressure controls.
Compressor cycles rapidly between load and unload	The external air receiver should be sized appropriately to prevent rapid cycles. The rapid response time will operate with small receivers, but any plant air system will operate more efficiently with adequately sized storage. Refer to the operating instructions for further information.
Low reservoir pressure before blowdown	The controller will maintain a minimum pressure in the oil reservoir while the blowdown valve is closed. This occurs only after initially loading the compressor unit. If reservoir pressure drops while the blowdown valve is closed, check for leaks between at the reservoir, separator, and connected piping.

Sympton	Recommended Action
Erractic pressures in SEQUENCE only	The sequencing system transmits low-level signals between units to communicate pressures. Units must be properly grounded to a good ground system, The sequencing system transmits low-level signals between units to communicate pressures. Units must be properly grounded to a good ground system, The communications cable should use only appropriate quality cable, and the cable should be run in its own conduit. (V4.xx only)
Compressor cycles rapidly in SEQUENCE mode only	In the sequence mode, the operating system requires all compressors be piped directly to the receiver, such that all transducers sense the same pressure. Check valves or restrictions between compressors and the storage will cause system instability. Run units in AUTOMATIC mode until the system is corrected. (V4.xx only)
Error in displayed pressure or "CHECK XDUCER" while zeroing	Pressure measurement errors are almost always the result of poor zero adjustment. This must be done after replacement of a controller or a transducer. The proper display with all pressure removed is 0 $\pm$1 psig. The adjustment procedure will prevent large zeroing errors, and recommend that the transducers be checked.

SECTION 6
ACCESSORIES

SPECIAL CONTROL ACCESSORIES

Auto Sentry software is available in the following versions. Installation requires the removal and replacement of an IC on the main controller circuit board. Replacement should be performed by an electronics technician. Refer to 304EBC1255 for detailed instructions. When changing between versions V4.xx and V6.xx, add or remove the jumpers at terminals 5 and 6 as shown on the wiring diagrams.

V6.xx Airpilot+ software is optimized for use with external control systems which determine when compressors must load and unload. Airpilot+ runs in Automatic mode at all times, does not have the External device input, Remote input, nor alarm relay. It provides a Local/Master input, Load/Unload input, and Compressor Available relay.

300EFD566 - V6.xxEE Airpilot+ control software, English only
301EFD566 - V6.xxEF Airpilot+ control software, English – French
302EFD566 - V6.xxES Airpilot+ control software, English – Spanish

V4.xx RS2000 software is optimized for use with other Gardner Denver screw compressors with RS2000 or ES+ controllers. RS2000 does not provide the Local/Master input, Load/Unload input, and Compressor Available relay output. It does provide an External device input, Remote input, and an alarm relay output. It provides four operating modes, and allows multiple units to be operated as a plant air system.

300EBC566 - V4.xxEE RS2000 control software, English only
301EBC566 - V4.xxEF RS2000 control software, English - French
302EBC566 - V4.xxES RS2000 control software, English - Spanish

ACCESSORIES FOR AUTO SENTRY RS2000

The following kits contain all electrical parts and instructions for field installation of accessory inputs for units with AUTO SENTRY RS2000 controllers, V4.xx only.

Kit number 205EAQ4014 provides a water pressure switch for installation on the water supply line.

Kit number 207EAQ4014 provides a voltage/phase monitor for 200-208 volt units.
Kit number 208EAQ4014 provides a voltage/phase monitor for 230-240 volt units.
Kit number 209EAQ4014 provides a voltage/phase monitor for 460-480 volt units.
Kit number 210EAQ4014 provides a voltage/phase monitor for 575-600 volt units.

SECTION 7
CONNECTION OF REMOTE-MOUNTED MAIN MOTOR STARTERS TO AUTO SENTRY CONTROL SYSTEMS

The majority of our rotary screw compressor packages feature starters completely wired and tested at the factory. Some special applications and large units, however, do not have the main motor starter mounted on the package. The following information describes special requirements for applications with a remote-mounted main starter.

STARTER

Regardless of starter type or brand, the following are required:

- The starter must have its own fused control circuit (and control transformer, if required for the starter).
- The starter must have provision for connection to a two-wire control circuit.
- The starter must have an isolated (dry contact) normally-open auxiliary contact.

INSTALLATION AND WIRING

The starter should be mounted and wired in accordance with the National Electrical Code and the manufacturer's instructions. Wiring from the load terminals of the starter to the motor should include flexible conduit to the motor junction box to allow for normal movement of the motor in the package.

The compressor package control box must have its own disconnect and overcurrent protection. If the package has a fan, the wiring should be sized for the fan horsepower and voltage. If the package does not include a fan, the only package load is the control transformer.

Install a separate conduit from the starter to the package control box for control wiring. Label and pull four control wires through this conduit. Since two separate supplies are involved, run one pair of red wires and one pair of yellow wires for identification.

CONTROLS CONNECTIONS

Disconnect and remove any manual starter controls which may be mounted on the starter or elsewhere. The starter must be controlled by the compressor controls for proper operation. The following is general information; refer to the unit wiring diagram for detailed connection.

Connect the control relay contact in the control box to the starter terminals for two-wire control. The terminals are identified in the control box as 40 & 41 on standard packages. Refer to the starter instructions for identification of the control terminals for two-wire control. Use the pair of yellow wires to indicate that this circuit is from a different source.

Connect the starter auxiliary contact to the compressor control box. When connecting this contact, make sure that no other wires are connected to it in the starter - it has to be an isolated contact. These two wire connect to terminals 4 & 9 on standard packages. Use the pair of red wires; this is powered from the compressor control panel control transformer.

CONTROLS CHECKOUT

Lock the disconnect switch for the starter in the open position. Energize the compressor package control panel. If the display indicates "SHUTDOWN - MAIN STRT CONTCT", the starter auxiliary contact is misconnected. Remove all power and correctly wire as indicated above.

If the package has a separate fan motor, enter the adjustments menu and perform a jog to check for proper fan rotation. If it is incorrect, disconnect power and switch two of the three wires to the fan motor. Restore power to the control box when done.

Relieve all pressure at the compressor package. With the main motor power still disconnected, press the [RUN] key. After a brief delay, The control should stop and display "SHUTDOWN - MAIN STARTER". This properly indicates that the starter did not function because it is turned off by the disconnect switch.

Unlock and close the disconnect switch for the main motor. Enter the adjustments menu to jog the compressor and check rotation. If it is incorrect, disconnect and lockout all power, reverse two of the three power phases at the starter. Restore power when done.

Press the [RUN] key. If the controller displays "SHUTDOWN - MAIN STARTER" and stops the unit, the starter auxiliary contact is misconnected. Remove all power and correctly wire as indicated above.

Press the [STOP/RESET] key to stop the compressor. The control should perform an orderly stop of the compressor unit and motor.

Gardner Denver

Specifications subject to change without notice.

 Litho in U.S.A.

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Sales and Service in all major cities.

For parts information, contact Gardner Denver,
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Telephone: (800) 245-4946 FAX: (901) 542-6159