FRONTIER

Operations & Maintenance Manual
Frontier Spray Booth

BUILT IN THE USA

GARMAT USA

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OPERATIONS AND MAINTENANCE INSTRUCTIONS

OPERATIONS INSTRUCTIONS ENCLOSED PAINT BOOTH

Garmat® Booth/Oven

WARNING: FAILURE TO HEED WARNINGS INCLUDED IN THIS MANUAL COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY, AND/OR DEATH.

The Garmat® Frontier Paint Booth is designed and manufactured in the United States. The Garmat® Frontier Paint Booth provides the optimal environment for the application of fine automotive finishes. Through continuous product design and improvement, Garmat® is committed to providing you and your customer with the finest automotive finish possible. Thorough study of this manual will not only aid you in your pursuit of a fine finish, it will assist you in making your pursuit safer and easier.

SUGGESTIONS FOR SAFETY

Before using this unit be sure to read all of the operation instructions and these safety suggestions carefully. Afterward, place them in the main control panel of the booth for future reference. Take special care to follow the warnings indicated on the unit, as well as the operating instructions.

PREPARATION OF THE CAR

One of the key elements of a fine finish is a dust free environment. The design of a Garmat Frontier Paint Booth is centered on providing a relatively dust free environment. Your preparation of the car before it enters the booth is very important to maintain a dust free environment.

Before moving the car into the spray booth, after the body of the car is properly prepared to accept the finish, wash the entire vehicle. Attention during the wash procedure should be directed to the underside of the vehicle as well. When the vehicle is completely dry and ready for refinishing, the entire vehicle should be blown off with compressed air. Again, attention must be paid to crevices around the hood, trunk lid, doors, air vents, etc.
Masking of the vehicle should be performed outside of the booth. Remember, your efforts to introduce a clean vehicle into a relatively dust-free environment provided by the Garmat Frontier Paint Booth will assist you in your pursuit of the finest finish with a minimum of work.

PREPARATION OF THE PAINTER

Proper protective clothing and gear is essential for the safety of the painter and production of a quality paint job. Paint suits are readily available in a variety of styles. Garmat recommends a close weave nylon type that breathes and has a hood. The suits should be cleaned regularly and should be worn only when the painter is actually engaged in painting. The painter should remove all dust from his clothes before putting the paint suit on. Whenever entering the Paint Booth, all dust should be removed from the paint suit, and any equipment. Anything that the painter brings into the booth is a potential cause of dust.

WARNING: APPROVED RESPIRATORS MUST BE WORN WHENEVER FINISHES ARE APPLIED.

NOTE: THE BOOTH MUST BE OPERATING WHENEVER ENTERING THE BOOTH

The Painter should try to stay in the booth as much as possible and limit going in and out between paint coats. He should have enough paint in the booth to complete that portion of the job.

PAINT BOOTH ENTRY

The Garmat® Frontier Paint Booth can be installed in a variety of configurations. Your Paint Booth as installed will include some of the following features:

FRONT ENTRY
DRIVE-THROUGH
Always center vehicle side-to-side, and front to back on pit or floor.

NOTE: THE BOOTH FANS MUST BE RUNNING WHENEVER A CAR IS MOVED IN OR OUT. THIS WILL REDUCE THE POSSIBILITY OF CONTAMINATION FROM THE SHOP

FRONT ENTRY AND DRIVE THROUGH:
Before moving a vehicle into the booth, assure that the vehicle and/or any attachments, i.e. mirrors, antennas, etc. will fit through the door you intend to use. All recommended preparation procedures outlined above must be completed. The booth must be operating. Vehicles should be driven slowly and carefully. Rapid acceleration or hard braking should be avoided at all times.

SUGGESTIONS FOR SAFETY
Before using this unit be sure to read all of the operating instructions and these safety suggestions carefully. Afterward, place them in the main electrical control panel for future reference. Take special care to follow the warnings indicated on the unit itself as well as the operating instructions.

WARNING: IF YOU SMELL GAS:
1. **OPEN WINDOWS.**
2. **DO NOT OPERATE ELECTRICAL SWITCHES.**
3. **EXTINGUISH ANY OPEN FLAME.**
4. **IMMEDIATELY CALL YOUR GAS SUPPLIER.**

WARNING: DO NOT USE OR STORE GASOLINE, PAINT, OR OTHER FLAMMABLE MATERIALS NEAR THE INTAKE AIR HEATER APPLIANCE (BOOTH MECHANICALS).

WARNING: WHEN VEHICLES ARE EQUIPPED WITH PROPANE (LPG) FUEL, THE FUEL TANK MUST BE LESS THAN HALF FULL BEFORE MOVING THE VEHICLE INTO THE BOOTH. THE PROPANE (LPG) TANK MUST HAVE ROOM FOR EXPANSION WITHIN THE TANK DURING BAKE CYCLE.

WARNING: DO NOT ENTER THE BOOTH DURING THE BAKE CYCLE.

WARNING: APPROVED RESPIRATORS MUST BE WORN WHENEVER FINISHES ARE BEING APPLIED.

The booth fans must be running whenever a car is moved into or out of the booth. The booth must be running whenever personnel are entering the booth.

Consult with your paint jobber or manufacturer concerning recommended refinishing temperatures, recommended bake temperatures and times.

WARNING: DO NOT EXPOSE THIS EQUIPMENT TO EXCESSIVE MOISTURE OR RAIN. DO NOT PRESSURE WASH OR HOSE WASH THE INTERIOR, EXTERIOR OF THE CABIN OR ITS' RELATED EQUIPMENT. THIS WILL VOID THE CABIN WARRANTY.

Review the recommended maintenance procedures and insure that the prescribed schedule is followed.

Disconnect all electrical supply and lock-off whenever covers on the mechanicals are removed for maintenance procedures.

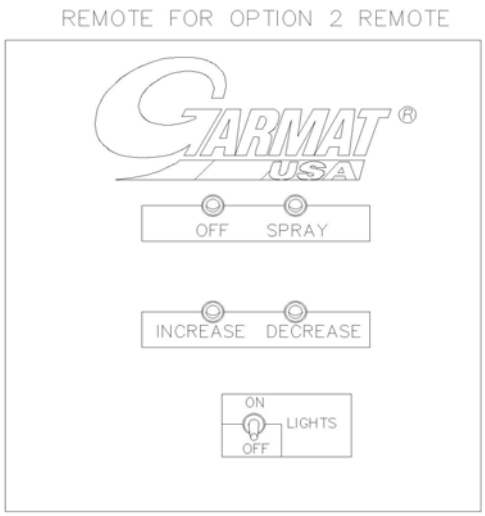
Do not over-tighten the fan belts. Proper tension is when there is ½" deflection at a mid point between the pulleys with moderate pressure on the belt. Belt

tension testers are available from drive belt suppliers. Drive belts should be adjusted after the first 40 hours of use and every three months after that.

In addition to adjustments explained in the maintenance instructions, you may attempt repairs your self. However, if you are not sure how to repair the unit, be sure to request service from a qualified technician or your local distributor.

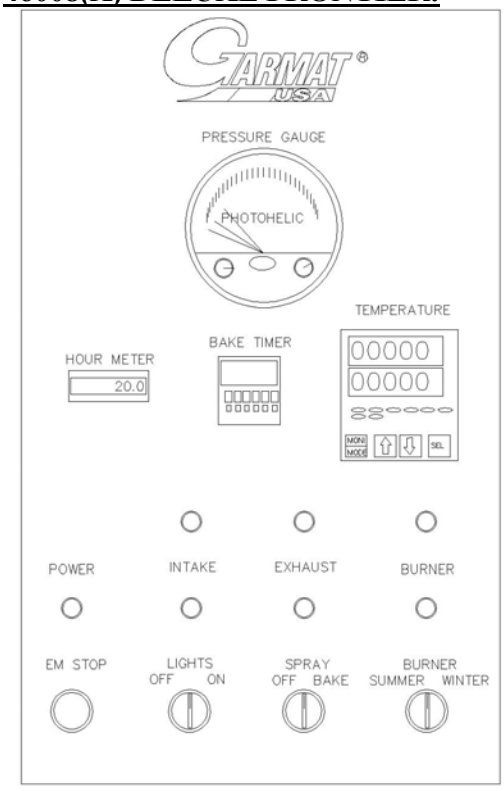
THE CONTROLS
Identification of components. The control components are located on the face of the Remote Control Panel. There are three available options for control of the booth.

44006(X) STANDARD FRONTIER:



1. **SPRAY SWITCH,** is a black push button switch that will start the intake and exhaust fans when pushed.
2. **OFF SWITCH,** is a black push button switch that will turn off the intake and exhaust fans when pushed.
3. **LIGHT SWITCH,** is a toggle switch that turn the lighting on and off.
4. **INCREASE/DECREASE PRESSURE SWITCHES,** are black push buttons that open and close the pressure damper.

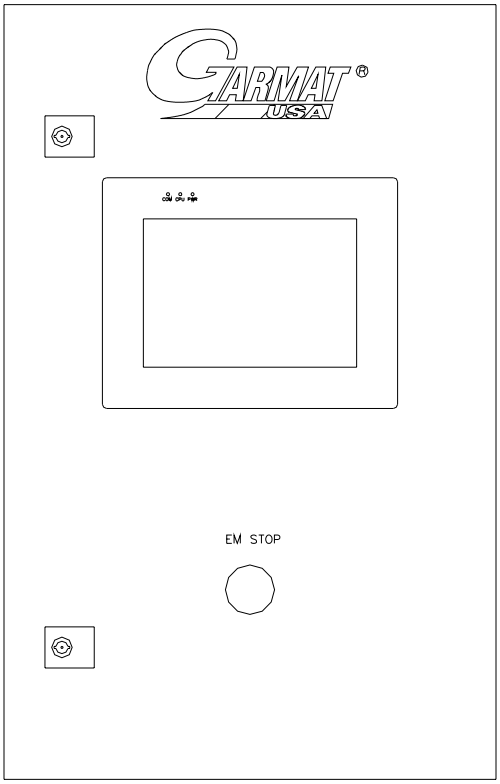
46008(X) DELUXE FRONTIER:



1. EMERGENCY (EM) STOP SWITCH is red in color.
2. LIGHTS ON/OFF SWITCH
3. OFF/SPRAY/BAKE SWITCH OR OFF/SPRAY SWITCH
4. BURNER SUMMER/WINTER SWITCH
5. POWER PILOT LIGHT (GREEN) indicates booth is ready for or already in operation when lit.
6. THE INTAKE PILOT LIGHT (RED), THE EXHAUST PILOT (RED) OR THE BURNER PILOT (RED), when lit indicates a problem exists with the Intake Motor, the Exhaust Motor, or the burner safeguard system.
7. HOURMETER records hours of operation in the spray mode. The hour meter is used to schedule filter replacement.
8. BAKE TIMER is energized only during the bake mode. This timer features a bar (top portion of unit), which initializes at 100% at the right and decreases to 0 at the end of the timed period. The mode indication (lower left corner of the timer) should be set at C. The bake time is set via thumbwheels (lower center). The timer function (lower right) should be set at M for minutes.

9. TEMPERATURE CONTROLLER provides a readout of the booth internal temperature and current set-point (one for spray and one, or three for bake depending on controller option). Some units will have a dial indicators i.e. model 99270 heater.
10. EXHAUST FAN PILOT LIGHT (GREEN) when lit indicates all is well with the exhaust motor and the exhaust fan is running.
11. INTAKE FAN PILOT LIGHT (GREEN) when lit indicates all is well with the intake motor and that the intake fan is running.
12. BURNER PILOT LIGHT (GREEN) when lit indicates power has been given to the burner safeguard system.
13. PHOTOHELIC provides readout of interior booth pressure and is set to maintain the cabin pressure automatically.

DELUXE W/TOUCH SCREEN OPTION:



1. EMERGENCY (EM) STOP SWITCH, is red in color.
2. LIGHTS ON/OFF SWITCH, located on the touch screen, dark green when off and light green when on.
3. OFF/SPRAY/BAKE SWITCH, located on the touch screen. The display bar at the bottom of the switch displays cycle of operation.
4. BURNER SUMMER/WINTER SWITCH, located on the touch screen, on the burner window.
5. THE INTAKE LIGHT (GREEN) OR(RED), THE EXHAUST LIGHT (GREEN) OR (RED), THE BURNER LIGHT (GREEN) OR (RED). When these light are showing (green), operation is normal. When these lights are showing (red), an alarm is taking place.
6. HOURMETER, located on the touch screen, records total hours of operation. The hour display window shows spray and bake time in hours and minutes. The hour meter is used to notify the need for filter replacement, based on spray hours of use.
7. BAKE TIMERS, are energized only during the bake mode. The bake timers are located on the touch screen in the bake timers display window. There is a bake time count down on the main screen of the touch screen.
8. TEMPERATURE CONTROL, is located on the touch screen, on the burner display window and provides a readout of the booth internal temperature and current set-point (one for spray and three for bake.
9. CABIN PRESSURE, cabin pressure is displayed on the main screen of the touch screen. It provides readout of interior booth pressure and is set to maintain the cabin pressure automatically or manually from the maintenance display screen.

MAIN ELECTRICAL PANEL

The control panel is fully described in the maintenance section of this manual.
The control panel is mounted to the side of the intake plenum near the booth front. It is white in color and contains the power and operational controls for the booth.

WARNING: THE MAIN ELECTRICAL PANEL IS SUPPLIED BY TWO SOURCES OF ELECTRICAL POWER. INSURE BOTH SOURCES ARE DISCONNECTED BEFORE

ANY ADJUSTMENTS IN THE PANEL ARE MADE.

The purge timer is an internal function of the PLC (Programmable Logic Controller) and is adjustable in minutes. This timer should not be set any lower than 3 minutes according to national codes. Consult your paint supplier or manufacturer for recommended flash-off time.

The bake timers are an internal function of the PLC and are adjustable in minutes. Consult your paint supplier or manufacturer for recommended bake times.

The cool down timer is an internal function of the PLC (Programmable Logic Controller) and is adjustable in minutes. Generally this timer is set a maximum of 10 minutes. This allows the operator to set the paint booth to bake mode and go home in the evening. The booth will complete the bake cycle, cool down for 10 minutes, and then shut down completely. The Off/Spray/Bake switch will need to be set to the Off position to allow the booth to operate after the system has gone through a cool down cycle and shut off automatically.

Adjustment of the purge, bake, and cool down cycles are made with the FTX handheld unit by a qualified technician. These time sequences are internal of the PLC.
When using the Touch Screen option adjustment of the purge, bake, and cool down cycles can be made from the bake timer display screen. There is also a recipe settings display screen accessed from the maintenance display screen. Complete setups for spray and bake temperatures and purge, bake, and cool down times can be set with a touch of a recipe button.

``REMOVING THE CAR

Review the instructions for entering the booth. Heed the warnings for the style of booth installed.
MAINTENANCE INSTRUCTIONS ENCLOSED PAINT BOOTH

FILTERS

To assure that the optimum-finishing environment designed into your Garmat® Frontier Paint Booth is maintained, filter replacement at recommended intervals and regular cleaning of the booth and the air-handling units is essential. Use only recommended filters and insure that the filters are properly installed.

The quality of finish produced by your Garmat® paint booth is affected by the following:

a. The filter media used and the timeliness of filter replacement.
b. The purity of compressed air used for applying the finish. Use a quality filter and moisture trap on compressed air lines supplying the booth. When using a copper airline, make sure that all connections to the equipment have di-electric unions.
c. Spray guns and other application equipment must be maintained perfectly clean and in proper working order.
d. Personnel clothing (paint suits) should be established for use only in the booth.
e. DO NOT mix paint within the booth.
f. LIMIT ACCESS to the booth.
g. DO NOT open booth doors unless the booth is operating.

FILTER LOCATION- Two main filter groups control the dust entering the booth and the paint particles emitted by the booth.

EXHAUST FILTER CHANGE AT 50-60 HOUR INTERVALS

The exhaust filters are located in the two towers located at the back of the booth. To access the filters rotate the access door latches, swing the access doors open and slid the filter racks out. The filter racks consist of two halves with one half nested inside of the other. Separate the two halves and remove the filter material and place in an air tight container. Sweep and/or vacuum up all debris

and dust. Cut new filter material slightly larger than the filter rack and place in the larger half of the filter rack. Slip the smaller half of the filter rack into the larger half. Repeat this for each filter rack and then replace in the exhaust towers. Reset the EXHAUST filter hours on the touch screen. Touch the word EXHAUST filters on the touch screen to access reset. On the filter schedule at the back of this manual, record the date, time and hour meter reading. Re-start the paint booth.

WARNING: USED EXHAUST FILTER MATERIAL IS FLAMMABLE AND IS SUSEPTIBLE TO SPONTAINOUS COMBUSTION. DISPOSE OF PROPERLY.

CEILING FILTER CHANGE AT 1000-1200 HOUR INTERVALS

NOTE: ALTHOUGH ONE MAN CAN REPLACE THE CEILING FILTERS, IT IS RECOMMENDED THAT TWO PEOPLE INSTALL THE NEW FILTERS TO INSURE PROPER PLACEMENT. USE HAND TOOLS ONLY.

Ceiling Filters are held in place by a removable filter frame in the ceiling of the cabin. Filter support bolts secure the filter frame. Rotate the support bolts clear of the frame, insuring that the frame will not fall free, and remove from the filter frame opening. Set filter frame on stands. Remove the used filter media, and thoroughly clean the filter frame with a tack rag. Place the new filter media in the filter frame, tuck the media into the ends of the frame, and then tuck the media into the sides of the frame. Raise the filter frame up into the filter frame opening. Rotate the support bolts back into place and tighten by hand making sure not to over tighten. Reset the ceiling filter hours on the touch screen. Touch the word CEILING FILTERS on the touch screen to access reset. The FLAME ROD in the burner should be replaced at this time.

MAINTENANCE SCHEDULE

DAILY

CHECK booth pressure and make sure the booth pressure is operating in the proper range, .02 Inches of Water Column (green in the pressure bar on the touch screen option).

SWEEP the floor while the booth is in operation. The booth floor may be mopped, with a well rung out mop.

CHECK the exhaust filters.

1000-HOUR INTERVAL (ANNUALLY)

At each 1000-hour interval, the following preventative maintenance checklist should be reviewed. If any malfunction is found, it should be repaired immediately.

MOTORS - Replace fan belts. Adjust for proper tension.

NOTE: Proper tension is ½" deflection at a mid point between the pulleys using moderate pressure. Tension testers are available at local belt and drive suppliers.

FANS- Check fan blade surfaces. Clean if necessary. Oil the blade surfaces after cleaning. DO NOT USE SILICON BASED OIL. In addition, oil the changeover damper hinges. Some hinges will have grease zerks.

BOOTH - Examine all door seals, replace with Garmat approved seals only. Change ceiling filters. Check exhaust filters and replace if necessary. Lubricate the larger hinges provided with grease zerks.
CAUTION: FAILURE TO PERFORM THE REQUIRED LUBRICATION WILL CAUSE PREMATURE FAILURE OF THIS EQUIPMENT. The moving mechanical portions of this equipment require regular lubrication not less than every 3 months. The items requiring regular lubrication include and are not limited to: door hinges, dampers, and motors. If you are unsure which items need lubrication, contact the equipment supplier. If extreme moisture is present, lubrication may need to be performed weekly.

CONTROL AIR – The air supplied to the Garmat USA, Inc. paint spray booth must be clean and dry before the attachment to the electrical control panel. Water separators, filtersystems for compressed air shall be installed up stream of the Garmat USA, Inc. main electrical control panel and filters, desiccant…etc. should be changed annually. Examine the regulator/filter and oilier for the control air (located at the side of the main control panel). Pressure should be set between 45-60 psi, drain the filter and refill the oilier with air tool oil.

CONTROL PANEL - Review the following:
a: Pressure settings.
b: Temperature settings
Touch screen option
a: Touch screen cover (peel away).
b: Touch screen operation.

FINALLY - Run the booth a complete cycle of operation and observe all functions.

AS RECOMENDED

MOTORS - In general, the motors supplied with your Garmat paint booth require lubrication and are fitted with grease zerks. Lubricate the motor with a good quality grease quarterly making sure not to force grease into the bearings. A ¼ squeeze on a normal hand pump grease gun is sufficient. Forcing grease into the bearing will damage the bearing seals and shorten the motor life.

HEATER SECTION- Gas fired heaters require little or no maintenance. However the burner manifold should be inspected to make sure there is no build up of debris or moisture. The flame rod in

the burner manifold should be replaced Annually. Also the burner manifold should be completely cleaned out every Four Years by a qualified service technician.

MAINTENANCE OF INTERNAL AND EXTERNAL SURFACES

To clean, use a soft, dry cloth. If the surfaces are extremely dirty, use a soft cloth, dipped into a soap and water solution or a weak detergent solution. Wring the cloth before wiping the surface. Wipe again with a soft, dry cloth.

Never use alcohol, paint thinner, benzine, nor a chemically treated cloth to clean this equipment. Such chemicals may damage the finish of your booth. Never pressure wash or hose down the interior or exterior of the booth, electrical shorts or shocks can occur. In addition, water will collect in light fixtures and various components of the booth cabin and rust deterioration will begin.

PRESSURE WASHING WILL VOID YOUR WARRANTY.

TROUBLESHOOTING

OPERATOR TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSE(S)	ACTION RECOMMENDED
NOTHING WORKS. (TOUCH SCREEN DARK)	EM switch is off. Incoming 3 phase voltage is off. The 110-v control breaker in main control panel is tripped.	Turn EM switch on. Check incoming 3 phase breaker at wall panel. Reset breaker in main control panel.
NOTHING WORKS. (TOUCH SCREEN ON AND A RED MOTOR LIGHT IS ON).	Overload relay is tripped. Loss of a phase. Low 3 phase voltage.	Reset overload relay. Check for 3 phase. Measure motor amps. Measure 3 phase voltage.
EVERYTHING WORKS BUT BOOTH LIGHTS.	Lighting breaker(s) are tripped.	Reset lighting breaker(s). Check change-over damper.
TEMPERATURE DOES NOT RISE. (BURNER GREEN LIGHT IS ON).	Outside air temperature is greater than set-point temperature.	Increase set point temperature on Temperature controller. Booth temperature will not exceed 190°F
TEMPERATURE DOES NOT RISE. (BURNER RED LIGHT IS ON).	Pilot has failed during fire cycle. Pilot manual gas valve turned off. High limit, low gas and/or high gas pressure switch tripped. proof of closure Open.	Push reset button on red enclosure marked FIREYE. Turn manual valve ON. If lockout repeats, call a Garmat USA authorized service-technician. Touch alarm on screen and follow instructions.
TEMPERATURE TOO HIGH DURING SPRAY MODE.	Controller is set to Bake or second Set-Point.	Outside temperature above 70°F. Press the Moni/Mode button and press the up arrow to Put the control into AUTO mode, press Moni/Mode button to go back top the normal display. Set SUMMER/WINTER switch to SUMMER.

OPERATION SEQUENCE

This section is provided to assist a service technician and explain in detail what is happening during "normal" operation.

SPRAY/BAKE BOOTH OPERATION
The spray/bake booth has four separate modes of operation: POWER ON, SPRAY, BAKE, and SHUTDOWN.

POWER ON:

The green light marked POWER is lit when the booth is in POWER ON mode. The 110v and 24v control voltages are provided from the secondary side of the control transformer. The primary side of the control transformer is connected to the incoming three-phase motor voltage supply.

The 120v is connected through a jumper connection provided for use with a NC contact on an alternative fire suppression system that

requires shutdown of the booth fans. Breaking the circuit at that point will shut down all booth operations. The 120v continues through the EM (emergency) stop switch in the remote control panel, and NC overload contacts of each Motor Starter. The 120v is then present at the light switch, off/spray/bake switch, and bake timer. If either motor trips to an overload condition, a RED light for the respective motor is lit, and all booth operations quit. Breakers protect both control voltages, 110v and 24v.

The EM switch, when depressed, shuts down all both operations. Turning the EM switch clockwise reconnects the supply voltage, unless the jumper circuit for the fire suppression system is open.

SPRAY MODE:
When the green power light is lit, placing the OFF-SPRAY-BAKE switch in the spray position begins the Spray Mode. The booth will operate in SPRAY mode indefinitely. The operator must shut off the booth, or switch to the Bake Mode. The SPRAY position provides 120v to the PLC (Programmable Logic Controller) and shows input "0" on the PLC input display. This in turn provides 110v to starter SM2 located in the Control Panel. SM2 controls the Exhaust Motor and shows as "10" on the PLC output display. The green light for the exhaust motor on the Control Panel should be lit. A time sequence is also started in the PLC as SM2 is energized. At the end of the time sequence, 110v power is provided to SM1 and the Temperature Controller and shows as "9" on the PLC output display. SM1 controls the intake motor and provides 120v to the green light for the intake motor and the BURNER switch. The temperature controller should show display and go through its' boot operations. All are located on the remote control panel.

If the BURNER switch is in the WINTER position, 120v power is provided to the PLC and shows as "3" on the PLC input display, which in turn provides 110v to the gas train power circuit shown as "7" on the PLC output display. See the text of the Gas Train Power Circuit. If the BURNER switch is in the SUMMER position, the Gas Train Power Circuit will not be energized as there will be no input to the PLC.

BAKE MODE:
Place the OFF-SPRAY-BAKE switch in BAKE provides 120v to the PLC and shows as "1" on the PLC input display. The PLC will perform a time sequence then power is applied to the Bake Timer located on the Remote Control Panel, the change over damper solenoid and relay RP in the main control panel. This places the booth in Bake Mode. The timer will begin timing. The Bake Timer should be set in its' "C" mode, on the left of the timer face, and "M" for minutes, on the right.

When the Change over damper solenoid is energized, the changeover damper is opened pneumatically releasing the Damper Position Valve. When released, the pressure switch (RA) connected to the Position Valve de-energizes input to the PLC shown as "11" on the PLC input display. This disconnects 110v power to the compressed air solenoid, shown as "5" on the PLC output display, and eliminates the 120v circuit to RL contactor, turning off the booth lighting. If the burner switch is in the summer position, the PLC will give 120v to the gas train circuit. The (RP) relay closes the second set point loop on the temperature controller. This sets the temperature controller to the second set point or starts the sequence of multiple temperature settings on a multi-set point controller (optional).

At the completion of the bake time, the Bake Timer stops timing and gives 120v input to the PLC shown as 14 on the PLC input display. This begins the Cool Down time sequence (Shutdown mode).

SHUTDOWN MODE:

The Bake Timer directs 120v power to then PLC and shows as 14 on the input display in the Main Control Panel, beginning the Shutdown mode. The power to the changeover damper solenoid and RP relay are interrupted. The changeover damper closes, RA are energized, the booth lights come back on, and the Temperature Controller returns to set point, SP, also known as the Spray Temperature. The output from the PLC will be de-energized shutting off the burner if the OFF-SPRAY-BAKE switch is set to summer position.

The PLC also begins and internal time cycle, normally 10 minutes, all functions of the booth will shut down completely at the end of the time cycle. The logic of the PLC will not allow the booth to restart until the OFF-SPRAY-BAKE switch is set to the OFF position. The Operator may interrupt the Shutdown Mode at any time by placing the OFF-SPRAY-BAKE switch in the SPRAY position.

GAS TRAIN POWER CIRCUIT:

When the burner switch is set to the winter position there will be input to terminal 4 of the PLC and will show number 3 on the input display of the PLC. The PLC checks to make sure that the input is at 0 on the input display and outputs to 7 on the output display, giving power to the low gas pressure switch. The PLC then makes a scan of the input to 4,5, 6 & 7, on the input screen, and then gives output to 12 on the output display, giving power to the Fireye unit and power to 1 on the output display giving power to the burner green light. The PLC will have input at 8 on the input display, showing power to the airflow switch. When the Fireye has done its' job there should be power to 9 on the input screen, showing that power has been given to the vent and blocking valves on the gas train. The PLC will also make the signal connection 0 on the output display, making the connection between the gas modulating valve and the temperature control. In the event the Fireye goes into the alarm state, there will be input to 10 on the input display and no input to 9 on the PLC input display. There will also be output to 2 on the output display, giving power to the burner red light and the output to 1 on the display, discontinuing the power to the burner green light.

The Low Gas and High Gas Limit, the Proof of Closure switch (all three are located on the gas train), the High Temperature switch (located on the roof of the cabin) or the Air Flow switch (Intake Pressure switch). Each of these items may be checked by proving 110 volts from their respective terminals at the top of the Main Control Panel. The airflow switch (intake pressure switch) is powered through the flame safety module, and has two terminals.

The flame safety module will give an alarm state (lighting the red burner light) for one of three reasons. One, there is no spark in the burner to ignite the burner pilot. Two, there is no fuel being delivered to the pilot to create a flame. Three, the flame guard device is not sensing that there is flame in the burner.

COMPRESSED AIR FOR SPRAY APPLICATIONS WITHIN BOOTH:

A solenoid is provided to control compressed air in the booth. It is located within the Main Control Panel. 110v power is provided to the solenoid through the PLC output 5 on the display. For the PLC to output at 5, the RA air over electric switch, Door air switch, and exhaust pressure switch must be closed giving power to the PLC input 12.

This section is provided to assist a service technician and explain in detail what is happening during "normal" operation of a booth with a Touch Screen option.

SPRAY/BAKE BOOTH OPERATION
The spray/bake booth has five separate modes of operation: POWER ON, SPRAY, BAKE, COOL DOWN and SHUTDOWN.

POWER ON:
The touch screen display is on when the booth is in POWER ON mode. The 110v and 24v control voltages are provided from the secondary side of the control transformer. The primary side of the control transformer is connected to the incoming three-phase motor voltage supply.

The 120v is connected through a jumper connection provided for use with a NC contact on an alternative fire suppression system that requires shutdown of the booth fans. Breaking the circuit at that point will shut down all booth operations. The 120v continues through the EM (emergency) stop switch in the remote control panel, and NC overload contacts of each Motor Starter. The 120v is then present at the light switch, the programmable logic controller (PLC) and the touch screen. If either motor trips to an overload condition, a RED light on the touch screen for the respective motor is lit, and all booth operations quit. Breakers protect both control voltages, 110v and 24v.

The EM switch, when depressed, shuts down all booth operations. Turning the EM switch clockwise reconnects the supply voltage, unless the jumper circuit for the fire suppression system is open.

SPRAY MODE:
When the touch screen is displayed, touching the word SPRAY will put the controls in the Spray Mode. The booth will operate in SPRAY mode indefinitely until the operator shuts off the booth, or switches to the Bake Mode. The SPRAY mode provides 120v to the PLC (Programmable Logic Controller) and shows input "0" on the PLC input display. This in turn provides 110v to starter SM2 located in the Control Panel. SM2 controls the Exhaust Fan Motor and shows as "10" on the PLC output display. The indicator light for the exhaust fan motor on the Touch Screen should be green. A time sequence is also started in the PLC as SM2 is energized. At the end of the time sequence, 110v power is provided to the temperature controls and starter SM1, located in the Control Panel. SM1 controls the Intake Fan Motor and shows as "9" on the PLC output display. The indicator light for the intake fan motor on the Touch Screen should be green. SM1 provides 120v to the burner control circuit. The touch screen will show the booth temperature and the controls should go through the boot operations.

If the BURNER switch is in the WINTER position, 120v power is provided to the PLC and shows as "3" on the PLC input display, which in turn provides 110v to the gas train power circuit shown as "7" on the PLC output display. See the text of the Gas Train Power Circuit. If the BURNER switch is in the SUMMER position, the Gas Train Power Circuit will not be energized as there will be no input to the PLC.

BAKE MODE:
Touching the word BAKE on the touch screen begins the Bake Mode and provides 120v to

the PLC and shows as "1" on the PLC input display. The PLC will perform a purge time sequence, during which the booth will remain in the spray mode temperature. At the end of the purge cycle the PLC will begin timing the Bake Cycle and energize the Changeover damper solenoid in the main control panel. This places the booth in Bake Mode.

When the Changeover damper solenoid is energized, the Changeover damper is pneumatically opened, releasing the Damper Position Valve. When the Damper Position Valve is released, the pressure switch (RA), connected to the Damper Position Valve, de-energizes and input is given to the PLC, shown as "11" on the PLC input display. This disconnects 110v power to the compressed air solenoid, shown as "5" on the PLC output display, and eliminates the 120v circuit to RL contactor, turning off the booth lighting. If the burner switch is in the SUMMER position, the PLC will give 120v to the Gas Train Power Circuit, shown as "7" on the PLC output display. In WINTER position the Gas Train Power Circuit will already have 120v power. The controls then initiate the ramp up time and temperature. This begins the sequence of multiple time and temperature settings.

At the completion of the bake time, the PLC stops the bake time sequence and begins the Cool Down time sequence (Shutdown mode).

SHUTDOWN MODE:
The power to the Changeover damper solenoid and RP relay is interrupted. The Changeover damper closes, RA is energized, the booth lights come back on, and the booth temperature returns to the Spray Temperature. The output from the PLC will be de-energized, shutting off the burner if the Burner switch on the touch screen display is set to SUMMER position. If the Burner switch is set to WINTER position, the burner circuit will remain energized.

The PLC also begins and internal time cycle, normally 10 minutes. All functions of the booth will shut down completely at the end of the time cycle. After the time cycle is complete, the logic of the PLC will not allow the booth to restart until the OFF-SPRAY-BAKE switch, displayed on the touch screen, is set to the OFF position. The Operator may interrupt the Shutdown Mode at any time before the time cycle is complete, by placing the OFF-SPRAY-BAKE switch in the SPRAY position.

GAS TRAIN POWER CIRCUIT:

When the BURNER switch (on the touch screen display) is set to the WINTER position there will be input to terminal 4 of the PLC and will show number "3" on the input display of the PLC. The PLC checks to make sure that the input is at "0" on the input display and outputs to "7" on the output display, giving power to the low gas pressure switch. The PLC then makes a scan of the input to "4,5, 6 & 7", on the input screen, and then gives output to "11" on the output display, giving power to the Fireye unit and power to "1" on the output display giving power to the burner green light. The PLC will have input at "8" on the input display, showing power to the airflow switch. When the Fireye has done its' job there should be power to "9" on the input screen, showing that power has been given to the vent and blocking valves on the gas train. The PLC will also make the signal connection "0" on the output display, making the connection between the gas modulating valve and the temperature controls. In the event the Fireye goes into the alarm state, there will be input to "10" on the input display and no input to "9" on the PLC input display. There will also be output to "2" on the output display, giving power to the burner red light, and discontinuing the power to the burner green light, output to "1" on the display,.

The Low Gas and High Gas Limit, the Proof of Closure switch (all three are located on the

gas train), the High Temperature switch (located on the roof of the cabin) or the Air Flow switch (Intake Pressure switch). Each of these items may be checked by proving 110 volts from their respective terminals at the top of the Main Control Panel. The airflow switch (intake pressure switch) is powered through the flame safety module, and has two terminals.

The flame safety module will give an alarm state (lighting the red burner light on the touch screen display) for one of three reasons. One, there is no spark in the burner to ignite the burner pilot. Two, there is no fuel being delivered to the pilot to create a flame. Three, the flame guard device is not sensing that there is flame in the burner.

COMPRESSED AIR FOR SPRAY APPLICATIONS WITHIN BOOTH:

A solenoid is provided to control compressed air in the booth. It is located within the Main Control Panel. 110v power is provided to the solenoid through the PLC output "5" on the display. For the PLC to output at "5", the RA air over electric switch, Door Air switch, and Exhaust Pressure switch must be closed giving power to the PLC input "12".

FILTER	HOURS	DATE	COMMENTS
	SPEC/ACTUAL		
EXHAUST	50/		
EXHAUST	100/		
EXHAUST	150/		
EXHAUST	200/		
EXT & INT	250/		
EXHAUST	300/		
EXHAUST	350/		
EXHAUST	400/		
EXHAUST	450/		
EXT & INT	500/		
EXHAUST	550/		
EXHAUST	600/		
EXHAUST	650/		
EXHAUST	700/		
EXT & INT	750/		
EXHAUST	800/		
EXHAUST	850/		
EXHAUST	900/		
EXHAUST	950/		
EXHAUST	1000/		
INTAKE	1000/		
CEILING	1000/		


WARNING
Do not enter during the bake cycle.
Remove propane fuel systems from vehicles prior to moving into booth/oven.
CAUTION
DO NOT WALK STAND OR STORE OBJECTS ON ROOF.
CAUTION
WARNING
CAUTION
WARNING
WARNING
WARNING
WARNING