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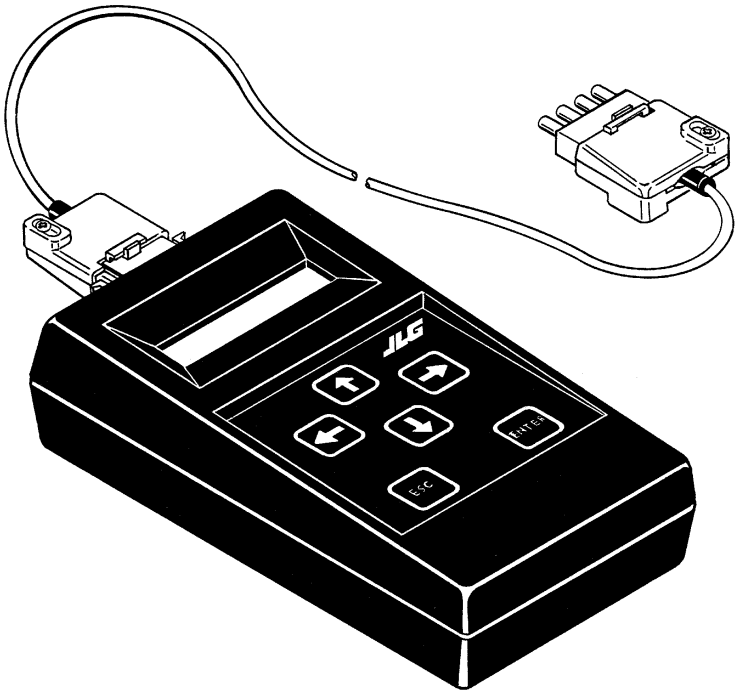
JLG SMART System™ Analyzer Kit Instruction Manual



MODELS
1532E
1932E
2033E
2046E
2646E
2658E

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SECTION 1. JLG SMART SYSTEM ™ ANALYZER KIT INSTRUCTIONS (1600258 CONTROLLER).

INTRODUCTION

The JLG designed SMART System™ is a 24 Volt multiplex motor control unit installed on the electric scissor lift models 1532E, 1932E, 2033E, 2046E, 2646E and 2658E.

The SMART System™ has **reduced** the need for **exposed** terminal strips, diodes and trimpots and provides simplicity in viewing and adjusting the various personality settings for smooth control of: acceleration, deceleration, creep and max-speed for the lift, drive, steering and optional power deck functions. The function select membrane board, in the upper control box, also eliminates the need for toggle switches and a separate power enable button as this feature is built into each function select button on the board itself.

The lift, drive and optional power deck functions are controlled by a joystick, with steering being controlled by a rocker switch built into the top of the joystick. Drive, lift, and the optional power deck functions are selected by first pushing the appropriate momentary select buttons on the membrane board and then moving the joystick either in the “A” or “B” direction. If the joystick is not activated within three seconds of selecting a function, it will be necessary to re-select a function. High drive and positive traction are used in conjunction with the drive function.

All motor controllers with a date code prior to 9808 have a power saving feature built into the motor controller to shut off power to the platform controls after ten minutes of idle time. All motor controllers manufactured with a date code after 9808 are featured with an approximate 10 seconds of idle time before the main contactor will open. To reset the system, you simply select a function or recycle the platform emergency stop button. The motor controller will control current output, as programmed for smooth operation and maximum cycle time. Ground control speeds for platform lift and the optional power deck are also programmed into the motor controller. The motor controller also features an adjustable time limit for positive traction. Another power saving feature is the high speed drive current limit. This feature will automatically control the drive speed and controller output when it exceeds the pre-set current limit for a specified time and reduce the motor speed, thus conserving power.

For safety, the machines are equipped with pothole protection and elevation cutback. The pothole protection is employed as the platform is raised. If the pothole protection does not extend, the drive function will be disabled. When the platform is raised, the drive function goes into creep mode.

The JLG SMART System™ controller has a built in LED to indicate any faults. The system stores the most recent faults, which may be accessed for troubleshooting. Optional equipment includes an hourmeter, beacon light, tilt switch (light and/or alarm), power deck, power deck extension limit, function cutout, and ground alarm. These options may be added later but must be programmed into the motor controller when installed.

The SMART System™ may be accessed in one of two ways: utilizing a custom designed, hand held analyzer (JLG kit no. 2901443) which will display two lines of information at a time, by scrolling through the program, or a personal computer/laptop computer may be used with the system software from JLG (JLG kit no. 2900874), loaded to run under DOS or Windows 3.1 or later. Using the PC/laptop computer will enable you to view the complete screen in each menu.

The instructions in this manual are for using the hand held analyzer.

NOTE: The date code is determined by the first four digits of the controller serial number which is located on the label attached to the front of the controller.
All SMART™ controllers prior to date code 9808 are JLG part number 1600258.
All SMART™ controllers with date code 9808 and later are JLG part number 1600286. The 1600286 SMART™ controller has built in advanced diagnostic capabilities and the menus and settings vary between the two. Please refer to the appropriate section in this manual for the correct analyzer use instructions.

To use the hand held analyzer: (1600258 Controller).

1. Connect the four pin end of the cable, supplied with the analyzer, to the top connection of the motor controller and connect the remaining end of the cable to the analyzer. NOTE: The cable has a four pin connector at each end of the cable; the cable cannot connect backwards.
2. Power up the SMART System™ by turning the lower key to the platform position and pulling both emergency stop buttons on.

The screen of the analyzer will look like the following:

ASPC MENU:

ACCESS LEVEL 3

Using the RIGHT and LEFT arrow keys, you can scroll throughout the top level menu items, which are:

ACCESS LEVEL

DIAGNOSTICS

PERSONALITIES

MACHINE SETUP

MACHINE DIGITS

Pressing ENTER at any of the above menu items takes you to the menu in that item. In some cases, such as ACCESS LEVEL, the next level is the parameter or information to be changed. Please note that MACHINE DIGITS can only be viewed and changed at access level 1. As an example of the next set of menu items, the following are the items under the PERSONALITIES menu:

PLATFORM

GROUND

Under these items are the actual personalities that can be viewed or edited. To see what these personalities are, refer to the organizational chart in figure 1-1.

The following is an example of how to view and change the DRIVE CREEP personality. This example assumes that the analyzer has been connected to the machine and the SMART System™ has been powered up.

1. Press the ENTER key when the screen shows the menu ACCESS LEVEL 3.
2. At the CODE prompt, enter 33271. To do this follow the steps below:
   a. The flashing cursor should be at the first digit. Use the UP arrow key to increase the number to 3.
   b. Use the RIGHT arrow key to scroll to the next digit and repeat step a.
   c. Repeat the process until the new code is showing and then press ENTER. If a digit is missed, use the LEFT arrow key to back up. If you pass the number desired to be entered at a digit, use the DOWN arrow key to decrease the value.
3. Use the RIGHT arrow key to scroll to the PERSONALITIES menu item and push ENTER.
4. Use the LEFT or RIGHT arrow keys to scroll to the DRIVE CREEP personality.
5. Use the UP and DOWN arrow keys to change the value of the personality. The value is now changed.
6. To view something in DIAGNOSTICS, use the ESC key to back out of the PERSONALITY menu and use the same procedure to get there.

NOTE: *Password 33271 will take you to access level 1, which will permit you to change all machine personality settings. There are some settings that JLG strongly recommends that you not change, and these settings will be so noted. Changing these settings may adversely affect the performance of your machine. All parameters accessible using the PC/laptop computer with the system software are accessible using the analyzer.*

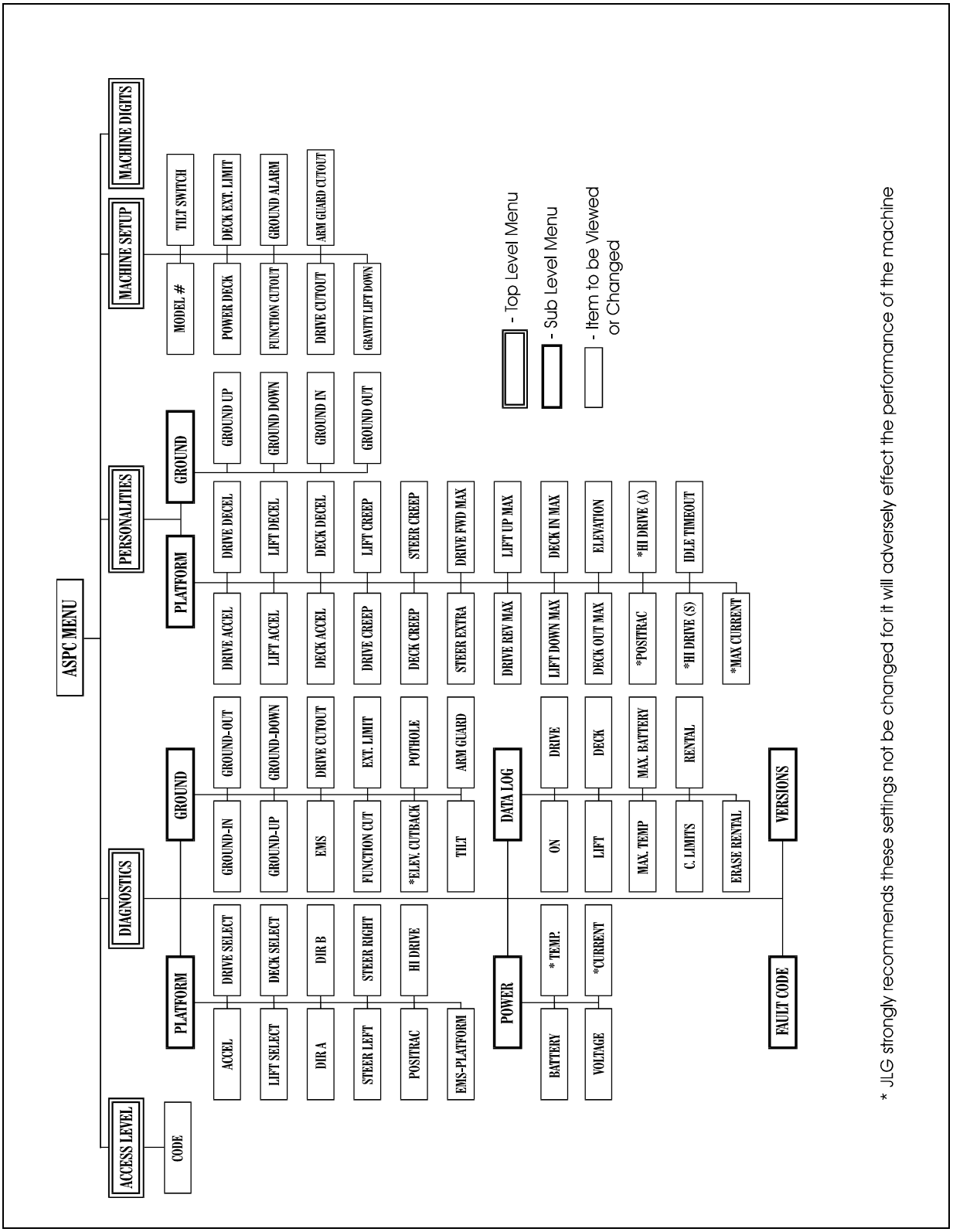

Figure 1-1. Organizational Chart - (Machines equipped with 1600258 Controller

Table 1-1. Machine Personality Settings - (Machines equipped with a 1600258 controller).

PERSONALITY	MIN	MAX
DRIVE-ACCEL	**0.5 SEC**	5.0 SEC
DRIVE-DECEL	**0 SEC**	5.0 SEC
LIFT-ACCEL	**0.5 SEC**	5.0 SEC
LIFT-DECEL	**0.5 SEC**	1.5 SEC
DECK-ACCEL	**0.5 SEC**	5.0 SEC
DECK-DECEL	**0 SEC**	5.0 SEC
DRIVE-CREEP	**1%**	25%
LIFT-CREEP	**1%**	25%
DECK-CREEP	**1%**	25%
STEER-ONLY-CREEP	**1%**	35% (see note one)
STEER-EXTRA-CREEP	**0%**	35%
DRIVE-FDW AND REV SPEED	**50%**	100% - ALL MODELS W / WHITE DRIVE MOTORS
DRIVE-FDW AND REV SPEED	**50%**	100% - MODEL 2033 W / EATON DRIVE MOTORS
DRIVE-FDW AND REV SPEED	**50%**	80% - MODELS 1532 & 1932 W / EATON DRIVE MOTORS
LIFT-UP-MAXSPEED	**50%**	100%
LIFT-DOWN-MAXSPEED	**30**	100% (see notes 2 and 3)
DECK-IN-MAXSPEED	**0**	100%
DECK-OUT-MAXSPEED	**0**	100%
GROUNDSPEED-UP	**0**	100%
GROUNDSPEED-DOWN	**0**	100% (see notes 2 and 3)
GROUNDSPEED-DECK IN	**0**	100%
GROUNDSPEED-DECK OUT	**0**	100%
IDLE-TIME-OUT	**0 MIN**	**30 MIN**

ADDITIONAL FIELD SERVICE SETTINGS

⚠ IMPORTANT

JLG STRONGLY RECOMMENDS THAT THE FOLLOWING SETTINGS NOT BE CHANGED. CHANGING THESE SETTINGS MAY ADVERSELY AFFECT THE PERFORMANCE OF YOUR MACHINE

Table 1-2. Additional Field Service Settings - (Machines Equipped with 1600258 controller).

PERSONALITY	MIN	MAX
MAX-CURRENT	0 A	200 A
ELEVATION-CUTBACK	0%	40%
POSITRAC-TIMEOUT	0 SEC	255 SEC
HIGHDRIVE-CURRENT-LIMIT	50 A	200 A
HIGHDRIVE-TIME-LIMIT	0 SEC	25 SEC

NOTE: *1. The steer-only-creep maximum varies, depending on the current machine model. It is not always 35%*

NOTE: *2. This adjustment is only for those machines equipped with power LIFT DOWN. To identify machines equipped with power LIFT DOWN, refer to the Effectivity Page for serial number identification.*

NOTE: *3. LIFT DOWN speed is non-adjustable on machines equipped with gravity LIFT DOWN. To Identify machines equipped with gravity LIFT DOWN, refer to the Effectivity Page for serial number identification.*

Table 1-3. Machine Model Default Settings Chart - (Machines equipped with 1600258 controller)

Adjustment	1532E	1932E	2033E	2046E	2646E	2658E
DRIVE ACCELERATION	1.0	1.0	1.0	1.0	1.0	1.0
DRIVE DECELERATION	0.5	0.5	0.5	0.5	0.5	0.5
LIFT ACCELERATION	1.0	1.0	1.0	1.0	1.0	1.0
LIFT DECELERATION	0.5	0.5	0.5	0.5	0.5	0.5
DECK EXT./RET. ACCELERATION	1.0	1.0	1.0	1.0	1.0	1.0
DECK EXT./RET. DECELERATION	0.5	0.5	0.5	0.5	0.5	0.5
DRIVE CREEP SPEED	8	8	9	9	10	10
LIFT CREEP SPEED	10	10	15	15	15	15
DECK CREEP SPEED	10	10	10	10	10	10
STEERING CREEP SPEED	20	20	20	25	25	30
STEER. DR. SPEED COMP.	20	20	20	20	20	20
DRIVE FWD & REV SPEED MAX. (EATON DRIVE MOTORS)	80	80	100	N/A	N/A	N/A
(WHITE DRIVE MOTORS)	100	100	100	100	100	100
LIFT UP SPEED MAXIMUM	80-90	90	100	100	100	100
LIFT DOWN SPEED MAXIMUM*	60-70*	70-80*	80-90*	90-100*	90-100*	90-100*
DECK RETRACTION SPEED MAX.	60	60	60	60	60	60
DECK EXTENSION SPEED MAX.	100	100	100	100	100	100
ELEVATION DRIVE CUT BACK**	25**	25**	30**	30**	30**	30**
POSITRAC HOLDING TIME**	10**	10**	10**	10**	10**	10**
GROUND LIFT UP SPEED	75	75	75	80	80	90-100
GROUND LIFT DOWN SPEED*	60-70*	60-70*	60-70*	60-70*	60-70*	60-70*
GROUND DECK IN SPEED	50	50	50	50	50	50
GROUND DECK OUT SPEED	50	50	50	50	40	40
HIGH DRIVE OVERCURRENT**	165**	165**	185**	185**	185**	185**
HIGH DRIVE TIME OUT**	5.0**	5.0**	5.0**	5.0**	5.0**	5.0**
MAXIMUM CURRENT**	220**	220**	220**	220**	220**	220**
IDLE TIME OUT	10	10	10	10	10	10

⚠ WARNING

CHANGING THE MACHINE MODEL WILL SET ALL PERSONALITIES BACK TO THE FACTORY DEFAULT SETTINGS. CHECK THE MACHINE MODEL ADJUSTMENT CHART FOR THE CORRECT SETTINGS FOR EACH MODEL. IF YOUR MACHINE DOES NOT MATCH THE PROPER SETTINGS FOR EACH MODEL, ADJUST THE SETTINGS AS NECESSARY IN ACCORDANCE WITH THE CHART.

NOTE: ** Unless disabled by machine digit #9 (Refer to Table 1-4).*

NOTE: ** The LIFT DOWN speeds listed in this chart are for those machines equipped with power LIFT DOWN. To identify machines equipped with power LIFT DOWN, refer to the Effectivity Page for serial number identification. The LIFT DOWN speeds listed in this chart are the desired speeds for each model. Actual LIFT DOWN speeds may vary from machine to machine, as each machine is factory-adjusted for maximum smoothness.*

NOTE: ** LIFT DOWN speed is non-adjustable on machines equipped with gravity LIFT DOWN.*

NOTE: *** JLG strongly recommends that these settings not be changed. Changing these settings may adversely affect the performance of your machine.*

NOTE: *The following information is to be used when working with the MACHINE SETUP menu. When configuring the E Series scissor lift, the machine configuration must be completed before any personality settings can be changed. Changing the personality settings first and then changing the model number of the machine configuration will cause the personality settings to return to default values.*

Table 1-4. Machine Configuration Programming Information (Machines equipped with 1600258 controller)

Configuration Digit	Number	Description	Default Setting Before Programming
1 (MODEL NUMBER)	1 2 3 4 5 6	MODEL 1532E MODEL 1932E MODEL 2033E MODEL 2046E MODEL 2646E MODEL 2658E	3
2 (TILT SWITCH)	0 1 2 3 4	No tilt switch installed. 5 tilt switch for North American machines. — This digit will allow the SMART System™ to indicate when the machine is more than 5 degrees out of level by lighting the light in the platform. If the machine is elevated and tilted, the SMART System™ will also sound the platform alarm continuously. No functions are cut back or cut out. 2 tilt switch for European machines. — This digit will allow the SMART System™ to indicate when the machine is more than 2 degrees out of level by lighting the light in the platform. If the machine is elevated and tilted, the SMART System™ will also sound the platform alarm continuously. No functions are cut back or cut out. 2 tilt switch for Australian machines. — This digit will allow the SMART System™ to indicate when the machine is more than 2 degrees out of level by lighting the light in the platform. If the machine is elevated and tilted, the SMART System™ will also sound the platform alarm continuously and the LIFT UP and DRIVE functions are cut out. 5 tilt switch for Latin American and Japanese machines.— This digit will allow the SMART System™ to indicate when the machine is more than 5 degrees out of level by lighting the light in the platform. If the machine is elevated and tilted, the SMART System™ will also sound the platform alarm continuously and the LIFT UP and DRIVE functions are cut out.	0
3 (POWER DECK)	0 1	No power deck installed. Machine equipped with power deck.	0

Table 1-4. Machine Configuration Programming Information (Machines equipped with 1600258 controller)

Configuration Digit	Number	Description	Default Setting Before Programming
4 (DECK EXT. LIMIT SWITCH)	0	Deck extension limit switch not installed. (Option Number 2 must be used if there is a power deck installed.)	0
	1	Cuts out LIFT DOWN when deck is extended. This digit is used with roll out decks that require a deck extension cutout. Sounds platform alarm for one second on, one second off, one second on, and three seconds off while operator tries to perform the function that has been cut out (provided the platform alarm has been installed).	
	2	Cuts out HIGH DRIVE when deck is extended and below elevation. Cuts out DRIVE when deck is extended and above elevation. This digit is used with a power deck. Sounds platform alarm for one second on, one second off, one second on, and three seconds off while operator tries to perform the function that has been cut out and during the LIFT DOWN function (provided the platform alarm has been installed).	
5 (FUNCTION CUTOUT)	0	No function cutout installed.	0
	1	Overload switch for French machines. — Cuts out all functions. Sounds platform alarm for two seconds on, two seconds off, while operator tries to perform the function that has been cut out (provided the platform alarm is installed).	
	2	Overload switch for Japanese machines. — Cuts out LIFT UP and DRIVE. Sounds platform alarm for two seconds on, two seconds off, while operator tries to perform the function that has been cut out (provided the platform alarm is installed).	
6 (GROUND ALARM)	0	No ground alarm installed.	0
	1	Descent alarm. — Sounds when LIFT DOWN is active.	
	2	Travel alarm. — Sounds when DRIVE function is active.	
	3	Motion alarm. — Sounds whenever the DRIVE, LIFT or DECK function is active.	
7 (DRIVE CUTOUT)	0	No drive cutout switch installed.	0
	1	Cuts out DRIVE when deck is elevated above a predetermined elevation (varies with machine model).	
8 (ARM GUARDS CUTOUT OR PLATFORM DESCENT DELAY SYSTEM)	0	No arm guards cutout.	0
	1	European (CE Specification) machines — allows LIFT DOWN until the deck is lowered to approximately two meters. Here it will cut out LIFT DOWN and sound the platform alarm for 1/2 second on, 1/2 second off, and repeat this for three seconds. After three seconds, the operator must re-select the LIFT function and continue to operate LIFT DOWN. If the wires to the limit switch used to detect the deck height are cut or the switch has failed, the platform alarm will sound as mentioned. The operator can re-select the LIFT function and then LIFT DOWN for ten seconds, at which time it will cut out again and the process must be repeated. NOTE: The alarm and cutout will be activated if the platform is above 2 meters, unless they have been activated in the previous ten seconds.	

Table 1-4. Machine Configuration Programming Information (Machines equipped with 1600258 controller)

Configuration Digit	Number	Description	Default Setting Before Programming
9 (LIFT DOWN)	0	Power lift down. (See Note)	0
	1	Gravity lift down. (See Note)	

NOTE: *E Series scissor lifts are equipped with either power lift down or gravity lift down. To identify machines equipped with power lift or gravity lift down, refer to the Effectivity Page for machine serial number identification.*

Table 1-5. JLG SMART System™ Flash Codes - (Machines equipped with1600258 controller)

Code	Description
1-1	Idle time-out
2-1	EMS inputs (both together, or neither).
2-2	Platform (digital) inputs (includes high drive > 10 seconds).
2-3	Ground (digital) inputs.
2-4	Steering (digital) inputs.
2-5	Cut-out input (not a fault but indication).
2-7	Accelerator (analog) input.
2-8	Arm guards or platform descent delay system cut-out.(European [CE Specification] Machines Only)
3-1	Line contactor open circuit or welded.
3-3	Line contactor (or other) driver short circuit (or tripped).
4-2	Temperature cut back.
4-4	Battery supply voltage out of range.
9-1	Watchdog reset.
9-2	EEprom fault.
9-3	Mux stream not being updated.
9-6	Point A short circuit.
9-7	Point A open circuit.
9-8	Motor open circuit.
9-9	Power circuit failure (driver short circuit, bat/cap < 15V).

NOTE: *Whenever troubleshooting a problem on an E series scissor lift, it may be necessary to use a digital VOM (volt ohm meter) in addition to the analyzer or the PC/laptop computer. NEVER use a test light when troubleshooting an E series scissor lift. ALWAYS disconnect the batteries when replacing parts.*

Table 1-6. JLG SMART System™ Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Machine Functions		
All Machine Functions Do Not Operate	Emergency Stop switch not activated.	Activate Emergency Stop switch and wait for flash of LED's.
	Joystick not in neutral position.(flash code 2-7)	Release joystick, then select function.
	Joystick potentiometer not centered.	Use analyzer to verify potentiometer is centered. (Axel should be 0) Replace joystick
	Idle time-out. (flash code 1-1)	Select function again.
	MUX STREAM NOT BEING UPDATED.(FLASH CODE 9-3)	
	No power to the multiplexer card in the platform.	Use voltmeter to verify power on J4 of the multiplexer board.
	Platform cable not connected to platform box or SMART Systemat base (J2).	Re-connect cable to platform box or J2.
	Faulty multiplexer card.	Replace multiplexer card.
	BATTERY VOLTAGE OUT OF RANGE.(FLASH CODE 4-4)	
	If battery charger is plugged in, voltage of batteries may be above 31 Volts	Check voltage with VOM. Unplug battery charger.
	Battery voltage too low.	Check voltage with VOM. Plug in battery charger.
	LINE CONTACTOR OPEN CIRCUIT.(FLASH CODE 3-1)	
	Loose wiring connections on line contactor or at harness connection J1	Check wire terminations on line contactor and harness connection at J1.Tighten connections as necessary.
	Open contact on line contactor.	Clean corrosion from line contactor.
		Replace line contactor.
	Faulty wiring at J1.	Repair or replace wiring as necessary.
	Line contactor welded. (flash code 3-1)	Replace line contactor.

Table 1-6. JLG SMART System™ Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
All Machine Functions Do Not Operate. (cont.)	Line contactor or other driver short-circuit or tripped. (flash code 3-3)	Disconnect valve harness at J1. Using an ohm meter, measure resistance between B - and each pin of the connector, except pin 10. Each reading should be 1 - 12 megaohms. If any reading is less, replace controller.
	POINT A SHORT CIRCUIT. (FLASH CODE 9-6)	
	Motor lead connections loose.	Check motor lead connections. Tighten connections as necessary.
	Faulty controller.	Replace controller.
	POINT A OPEN CIRCUIT. (FLASH CODE 9-7)	
	Faulty controller.	Replace controller.
	Stalled motor.	Determine cause. Repair or replace motor as necessary.
	Faulty motor.	Replace motor.
No drive function when platform fully lowered. Lift function okay.	CUTOUT INPUT. (FLASH CODE 2-5)	
	Malfunctioning limit switch.	Use analyzer to verify limit switch inputs.Drive cutout and Elevation cutout should be HI. Adjust or repair malfunctioning limit switch.
No drive function when platform elevated. Lift function okay.	CUTOUT INPUT. (FLASH CODE 2-5)	
	Malfunctioning limit switch	Use analyzer to verify limit switch inputs.Pothole should be HI. Adjust or repair malfunctioning limit switch.
	Platform above drive cutout height.	Lower platform below drive cutout height.
Machine cannot lift down. Lift up function okay.	CUTOUT INPUT. (FLASH CODE 2-5)	
	Deck extension extended.	Use analyzer to verify limit switch inputs.Extension limit should be HI.Retract deck extension.

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SECTION 2. JLG SMART SYSTEM ™ ANALYZER KIT INSTRUCTIONS (CONTROLLER 1600286).

INTRODUCTION

The JLG designed SMART System™ is a 24 Volt multiplex motor control unit installed on the electric scissor lift models 1532E, 1932E, 2033E, 2046E, 2646E and 2658E.

The SMART System™ has **reduced** the need for **exposed** terminal strips, diodes and trimpots and provides simplicity in viewing and adjusting the various personality settings for smooth control of: acceleration, deceleration, creep and max-speed for the lift, drive, steering and optional power deck functions. The function select membrane board, in the upper control box, also eliminates the need for toggle switches and a separate power enable button as this feature is built into each function select button on the board itself.

The lift, drive and optional power deck functions are controlled by a joystick, with steering being controlled by a rocker switch built into the top of the joystick. Drive, lift, and the optional power deck functions are selected by first pushing the appropriate momentary select buttons on the membrane board and then moving the joystick either in the “A” or “B” direction. If the joystick is not activated within three seconds of selecting a function, it will be necessary to re-select a function. High drive and positive traction are used in conjunction with the drive function.

All motor controllers with a date code prior to 9808 have a power saving feature built into the motor controller to shut off power to the platform controls after ten minutes of idle time. All motor controllers manufactured with a date code after 9808 are featured with an approximate 10 seconds of idle time before the main contactor will open. To reset the system, you simply select a function or recycle the platform emergency stop button. The motor controller will control current output, as programmed for smooth operation and maximum cycle time. Ground control speeds for platform lift and the optional power deck are also programmed into the motor controller. The motor controller also features an adjustable time limit for positive traction. Another power saving feature is the high speed drive current limit. This feature will automatically control the drive speed and controller output when it exceeds the pre-set current limit for a specified time and reduce the motor speed, thus conserving power.

For safety, the machines are equipped with pothole protection and elevation cutback. The pothole protection is employed as the platform is raised. If the pothole protection does not extend, the drive function will be disabled. When the platform is raised, the drive function goes into creep mode.

The JLG SMART System™ controller has a built in LED to indicate any faults. The system stores recent faults which may be accessed for troubleshooting. Optional equipment includes an hourmeter, beacon light, tilt switch (light and/or alarm), power deck, power deck extension limit, function cutout, and ground alarm. These options may be added later but must be programmed into the motor controller when installed.

The SMART System™ may only be accessed utilizing a custom designed, hand held analyzer (JLG kit no. 2901443) which will display two lines of information at a time, by scrolling through the program.

The instructions in this manual are for using the hand held analyzer.

NOTE: The date code is determined by the first four digits of the controller serial number which is located on the label attached to the front of the controller.
All SMART™ controllers prior to date code 9808 are JLG part number 1600258.
All SMART™ controllers with date code 9808 and later are JLG part number 1600286. The 1600286 SMART™ controller has built in advanced diagnostic capabilities and the menus and settings vary between the two. Please refer to the appropriate section in this manual for the correct analyzer use instructions.

updated: 11/98

JLG SMART System™Analyzer Instructions for Controller Number1600286

NOTE: *The part number of the controller is located on the controller decal.*

- To connect the hand held analyzer for **ALL 1600286 controllers**:

1. Connect the four pin end of the cable supplied with the analyzer, to the top connection of the motor controller and connect the remaining end of the cable to the analyzer.

NOTE: *The cable has a four pin connector at each end of the cable; the cable cannot be connected backwards.*

2. Power up the SMART System™ by turning the lower key to the platform position and pulling both emergency stop buttons on.

- Using the analyzer with **ALL 1600286 controllers:**

With the machine power on and the analyzer connected properly, the analyzer will display the following:

HELP:

PRESS ENTER

At this point, using the **RIGHT** and **LEFT** arrow keys, you can move between the top level menu items. To select a displayed menu item, press **ENTER.** To cancel a selected menu item, press **ESC**; then you will be able to scroll using the right and left arrow keys to select a different menu item.

The top level menus are as follows:

HELP

DIAGNOSTICS

RUN SYSTEMS TEST (NOTE:Ensure machine is fully lowered before running systems test)

ACCESS LEVEL

PERSONALITIES

MACHINE SETUP

CALIBRATIONS (level 1 only)

If you press **ENTER**, at the HELP:PRESS ENTER display, and a fault is present during power up, the analyzer display will scroll the fault across the screen. If there was no fault detected during power up, the display will read: **HELP: EVERYTHING OK**

If **ENTER** is pressed again, the display moves to the following display:

LOGGED HELP

1: STARTUP (2/1)

At this point, the analyzer will display the current fault, if any are present. You may scroll through the fault logs to view what the last ten faults were. Use the right and left arrow keys to scroll through the fault logs. To return to the beginning, press **ESC** two times.

When a top level menu is selected, a new set of menu items may be offered; for example:

PLATFORM

GROUND

SYSTEMS

DATA LOG

VERSIONS

DRIVE

LIFT

STEER

GROUND MODE

MACHINE

Pressing **ENTER** with any of the above displayed menus, will display additional sub-menus within the selected menu. In some cases, such as **DRIVE**, the next level is the parameter or information to be changed. Refer to the flow chart for what menus are available within the top level menus. You may only view the personality settings for selected menus while in access level 3. Remember, you may always cancel a selected menu item by pressing the **ESC** key.

- Changing the access level of the hand held analyzer: (ALL 1600286 controllers)

When the analyzer is first connected, you will be in access level 3 which enables you to only view most configuration settings which cannot be changed until you enter a password to advance to a lower level. This ensures that a setting cannot be accidentally altered. To change the access level, the correct password must be entered. To enter the password, scroll to the **ACCESS LEVEL** menu. For example:

MENU:

ACCESS LEVEL 3

Press **ENTER** to select the **ACCESS LEVEL** menu.

Using the **UP** or **DOWN** arrow keys, enter the first digit of the password, 3.

Then using the **RIGHT** arrow key, position the cursor to the right one space to enter the second digit of the password.

Use the **UP** or **DOWN** arrow key to enter the second digit of the password which is 3.

Repeat this process until you have entered all five digits of the password which is **33271**.

Once the correct password is displayed, press **ENTER**.

The access level should display the following, if the password was entered correctly:

MENU:

ACCESS LEVEL 1

Repeat the above steps if the correct access level is not displayed or you can not adjust the personality settings.

- Adjusting configuration using the hand held analyzer on ALL 1600286 controllers:

Once you have gained access to level 1, and a personality item is selected, press the **UP** or **DOWN** arrow keys to adjust its value, for example:

PERSONALITIES:

DRIVE ACCEL 1.0s

There will be a minimum and maximum for the value to ensure efficient operation. The value will not increase if the **UP** arrow is pressed when at the maximum value nor will the value decrease if the **DOWN** arrow is pressed and the value is at the minimum value for any particular personality. If the value does not change when pressing the up and down arrows, check the access level to ensure you are at access level 1.

When a machine digit item is selected, press the **UP** or **DOWN** arrow keys to adjust its value, for example:

GROUND ALARM:

2=DRIVE

The effect of the machine digit value is displayed along with its value. The above display would be selected if the machine was equipped with a ground alarm and you wanted it to sound when driving. There are certain settings allowed to install optional features or select the machine model.

When selecting the machine model to match the size of the machine, the personality settings will all default to the factory recommended settings. **Note: Refer to the appropriate Machine Personality Settings Table, and the Machine Setup Table in the JLG Service Manual for the recommended factory settings. Refer to the JLG part number of the controller, printed on the front label, to select the correct table in the manual.**

NOTE: *Password 33271 will give you access to level 1, which will permit you to change all machine personality settings. There are some settings that JLG strongly recommends that you do not change. These settings are so noted below:*

MAX CURRENT

ELEVATION CUTBACK

POSITRAC TIMEOUT

HIGH DRIVE CURRENT LIMIT

HIGH DRIVE TIME LIMIT

CALIBRATION

⚠ WARNING

CHANGING THESE SETTINGS MAY ADVERSELY AFFECT THE PERFORMANCE OF YOUR MACHINE.

⚠ IMPORTANT

WHEN INSTALLING A NEW SMART SYSTEM CONTROLLER ON THE MACHINE, ELECTRICAL SILICONE GREASE, JLG PART NUMBER 0100076 OR 7016397, MUST BE APPLIED TO THE BACK OF THE CONTROLLER.

⚠ IMPORTANT

IT IS A GOOD PRACTICE TO AVOID PRESSURE-WASHING ELECTRICAL/ELECTRONIC COMPONENTS. SHOULD PRESSURE-WASHING BE UTILIZED TO WASH AREAS CONTAINING ELECTRICAL/ELECTRONIC COMPONENTS, JLG INDUSTRIES, INC. RECOMMENDS A MAXIMUM PRESSURE OF 750 PSI (52 BAR) AT A MINIMUM DISTANCE OF 12 INCHES (30.5 CM) AWAY FROM THESE COMPONENTS. IF ELECTRICAL/ELECTRONIC COMPONENTS ARE SPRAYED, SPRAYING MUST NOT BE DIRECT AND BE FOR BRIEF TIME PERIODS TO AVOID HEAVY SATURATION.

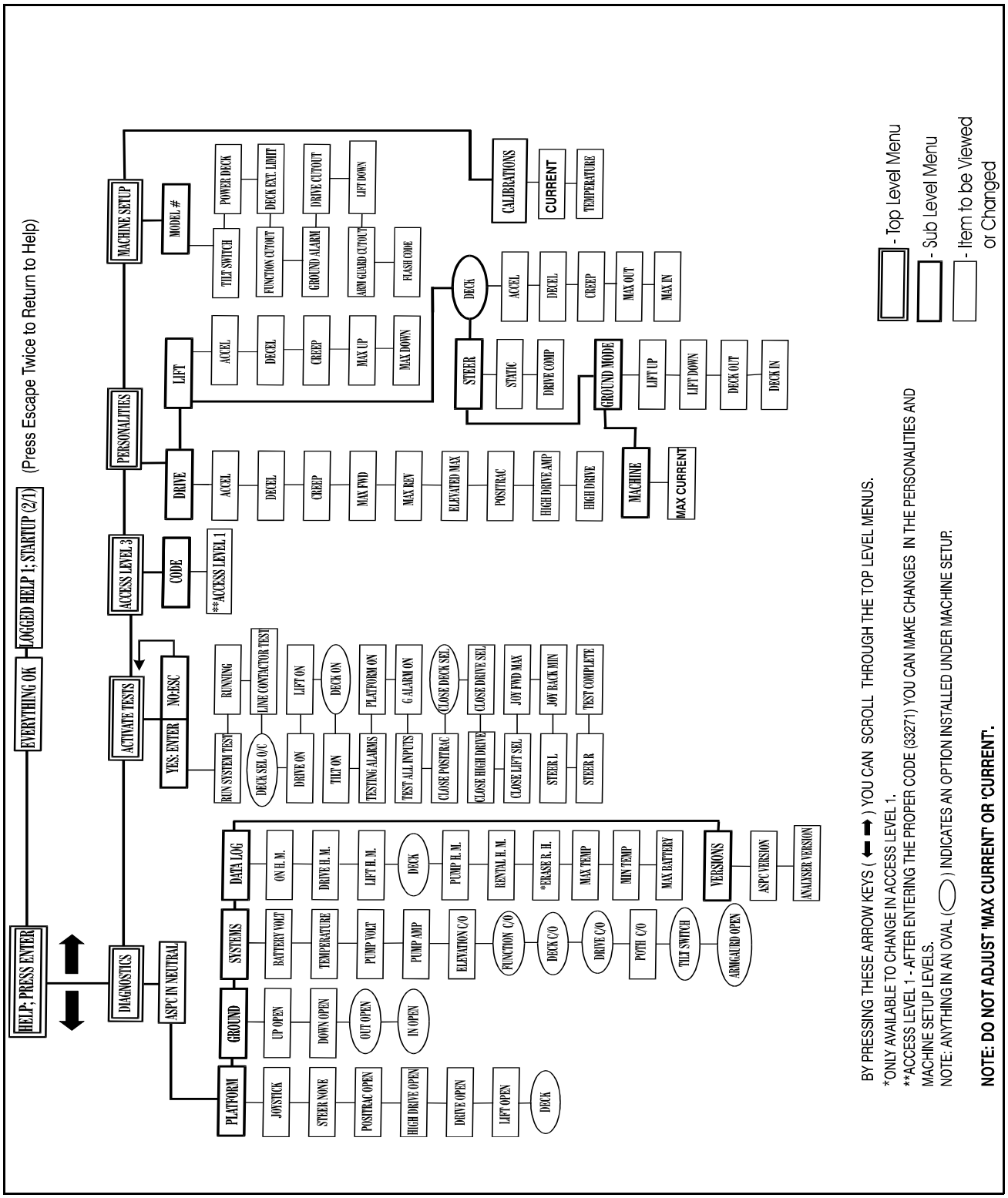

Figure 2-1. Organizational Chart - (Machines equipped with 1600286 controller)

Table 2-1. Machine Personality Settings - (Machines equipped with a 1600286 controller).

PERSONALITY	MIN	MAX
DRIVE-ACCEL	0.5 SEC	5.0 SEC
DRIVE-DECEL	0 SEC	5.0 SEC
DRIVE CREEP	1%	25.0%
DRIVE FWD AND REV SPEED	50%	100% ALL MODELS W/WHITE DRIVE MOTORS
DRIVE FWD AND REV SPEED	50%	100% MODEL 2033 W/EATON DRIVE MOTORS
DRIVE FWD AND REV SPEED	50%	80% MODELS 1532 &1932 W/EATON DRIVE MOTORS
*ELEVATED MAX	*0%	*40%
*POSI-TRAC	*0 Sec	*60 Sec
*HIGH DRIVE AMP	*50 Amp	*200 Amp
HIGH DRIVE	0 Sec	25 Sec
LIFT ACCEL	0.5 Sec	5.0 Sec
LIFT DECEL	0.0 Sec	5.0 Sec
LIFT CREEP	1.0 Sec	25%
MAX UP	50%	100%
MAX DOWN	30%	100% (See notes 1 and2 on the following page)
DECK ACCEL	0.5%	5%
DECK DECEL	0.5%	5%
CREEP	1%	25%
DECK MAX OUT	0	100%
DECK MAX IN	0	100%
STEER STATIC	20%	50%
STEER DRIVE COMP	0	35%
GROUND LIFT UP	0%	100%
GROUND LIFT DOWN	0%	100% (See notes 1 and2 on the following page)
GROUND DECK OUT	0%	100%
GROUND DECK IN	0%	100%
MACHINE MAX CURRENT	*0 Volt	*100%

***JLG strongly recommends that these settings not be changed. Changing these settings may adversely affect the performance of your machine.**

NOTE: ***1.*** *This adjustment is only for those machines equipped with power LIFT DOWN. To identify machines equipped with power LIFT DOWN, refer to the Effectivity Page for serial number identification.*
2. *LIFT DOWN speed is non-adjustable on machines equipped with gravity LIFT DOWN. To Identify machines equipped with gravity LIFT DOWN, refer to the Effectivity Page for serial number identification.*

Table 2-2. Machine Model Default Settings Chart - (Machines equipped with 1600286 controller)

Adjustment	1532E	1932E	2033E	2046E	2646E	2658E
DRIVE ACCELERATION	1.0	1.0	1.0	1.0	1.0	1.0
DRIVE DECELERATION	0.5	0.5	0.5	0.5	0.5	0.5
LIFT ACCELERATION	1.0	1.0	1.0	1.0	1.0	1.0 to 0 sec
LIFT DECELERATION (Gravity Down Only)	0.0	0.0	0.0	0.0	0.0	0.0
LIFT DECELERATION (Power Down Only)	0.5	0.5	0.5	0.5	0.5	0.5
DECK EXT./RET. ACCELERATION	1.0	1.0	1.0	1.0	1.0	1.0
DECK EXT./RET. DECELERATION	0.5	0.5	0.5	0.5	0.5	0.5
DRIVE CREEP SPEED	8	8	9	9	10	10
LIFT CREEP SPEED	10	10	15	15	15	15
DECK CREEP SPEED	10	10	10	10	10	10
STATIC STEERING CREEP SPEED	30	30	30	35	35	35
STEER. DR. SPEED COMP.	20	20	20	20	20	20
DRIVE FWD & REV SPEED MAX. (EATON DRIVE MOTORS)	80	80	100	N/A	N/A	N/A
(WHITE DRIVE MOTORS)	100	100	100	100	100	100
LIFT UP SPEED MAXIMUM	80-90	90	100	100	100	100
LIFT DOWN SPEED MAXIMUM*	60-70*	70-80*	80-90*	90-100*	90-100*	90-100*
DECK RETRACTION SPEED MAX.	60	60	60	60	60	60
DECK EXTENSION SPEED MAX.	100	100	100	100	100	100
ELEVATION DRIVE CUT BACK**	30**	30**	30**	30**	30**	30**
POSITRAC HOLDING TIME**	10**	10**	10**	10**	10**	10**
GROUND LIFT UP SPEED	75	75	75	80	80	90-100
GROUND LIFT DOWN SPEED*	60-70*	60-70*	60-70*	60-70*	60-70*	60-70*
GROUND DECK IN SPEED	50	50	50	50	50	50
GROUND DECK OUT SPEED	50	50	50	50	40	40
HIGH DRIVE OVERCURRENT**	165**	165**	185**	185**	185**	185**
HIGH DRIVE TIME OUT**	5.0**	5.0**	5.0**	5.0**	5.0**	5.0**
MAXIMUM CURRENT**	220**	220**	220**	220**	220**	220**

⚠ WARNING

CHANGING THE MACHINE MODEL WILL SET ALL PERSONALITIES BACK TO THE FACTORY DEFAULT SETTINGS. CHECK THE MACHINE MODEL ADJUSTMENT CHART FOR THE CORRECT SETTINGS FOR EACH MODEL. IF YOUR MACHINE DOES NOT MATCH THE PROPER SETTINGS FOR EACH MODEL, ADJUST THE SETTINGS AS NECESSARY IN ACCORDANCE WITH THE CHART.

NOTE: ** Unless disabled by machine digit #9.*

NOTE: ** The LIFT DOWN speeds listed in this chart are for those machines equipped with power LIFT DOWN. To identify machines equipped with power LIFT DOWN, refer to the Effectivity Page for serial number identification. The LIFT DOWN speeds listed in this chart are the desired speeds for each model. Actual LIFT DOWN speeds may vary from machine to machine, as each machine is factory-adjusted for maximum smoothness.*

NOTE: ** LIFT DOWN speed is non-adjustable on machines equipped with gravity LIFT DOWN.*

NOTE: *** JLG strongly recommends that these settings not be changed. Changing these settings may adversely affect the performance of your machine.*

NOTE: *The following information is to be used when working with the MACHINE SETUP menu. When configuring the E Series scissor lift, the machine configuration must be completed before any personality settings can be changed. Changing the personality settings first and then changing the model number of the machine configuration will cause the personality settings to return to default values.*

Table 2-3. Machine Configuration Programming Information (Machines equipped with 1600286 controller)

Configuration Digit	Number	Description	Default Setting Before Programming
1 (MODEL NUMBER)	1 2 3 4 5 6	MODEL 1532E MODEL 1932E MODEL 2033E MODEL 2046E MODEL 2646E MODEL 2658E	3
2 (TILT SWITCH)	0 1 2	No tilt switch installed. Tilt switch installed with a lamp indicator in the platform control box. Tilt switch installed with a lamp indicator in the platform control box and a cutout which prevents the machine from driving or lifting up.	0
3 (POWER DECK)	0 1	No power deck installed. Machine equipped with power deck.	0
4 (DECK EXT. LIMIT SWITCH)	0 1 2	Deck extension limit switch not installed. (Option Number 2 must be used if there is a power deck installed.) Cuts out LIFT DOWN when deck is extended. This digit is used with roll out decks that require a deck extension cutout. Sounds platform alarm for one second on, one second off, one second on, and three seconds off while operator tries to perform the function that has been cut out (provided the platform alarm has been installed). Cuts out HIGH DRIVE when deck is extended and below elevation. Cuts out DRIVE when deck is extended and above elevation. This digit is used with a power deck. Sounds platform alarm for one second on, one second off, one second on, and three seconds off while operator tries to perform the function that has been cut out and during the LIFT DOWN function (provided the platform alarm has been installed).	0
5 (FUNCTION CUTOUT)	0 1 2	No function cutout installed. Overload switch for French machines. — Cuts out all functions. Sounds platform alarm for two seconds on, two seconds off, while operator tries to perform the function that has been cut out (provided the platform alarm is installed). Overload switch for Japanese machines. — Cuts out LIFT UP and DRIVE. Sounds platform alarm for two seconds on, two seconds off, while operator tries to perform the function that has been cut out (provided the platform alarm is installed).	0

Table 2-3. Machine Configuration Programming Information (Machines equipped with 1600286 controller)

Configuration Digit	Number	Description	Default Setting Before Programming
6 (GROUND ALARM)	0	No ground alarm installed.	0
	1	Descent alarm. — Sounds when LIFT DOWN is active.	
	2	Travel alarm. — Sounds when DRIVE function is active.	
	3	Motion alarm. — Sounds whenever the DRIVE, LIFT or DECK function is active.	
7 (DRIVE CUTOUT)	0	No drive cutout switch installed.	0
	1	Cuts out DRIVE when deck is elevated above a predetermined elevation (varies with machine model).	
8 (ARM GUARDS))	0	No arm guards cutout.	0
	1	European (CE Specification) machines — allows LIFT DOWN until the deck is lowered to approximately two meters. Here it will cut out LIFT DOWN and sound the platform alarm for 1/2 second on, 1/2 second off, and repeat this for three seconds. After three seconds, the operator must re-select the LIFT function and continue to operate LIFT DOWN. If the wires to the limit switch used to detect the deck height are cut or the switch has failed, the platform alarm will sound as mentioned. The operator can re-select the LIFT function and then LIFT DOWN for ten seconds, at which time it will cut out again and the process must be repeated. NOTE: The alarm and cutout will be activated if the platform is above 2 meters, unless they have been activated in the previous ten seconds.	
9 (LIFT DOWN)	0	Power lift down. (See Note)	0
	1	Gravity lift down. (See Note)	
10 (Flash Codes)	0	LED Only	
	1	LED and lamps in platform control box	
	2	LED and alarm	
	3	LED, lamps in control box and alarm	

NOTE: *E Series scissor lifts are equipped with either power lift down or gravity lift down. To identify machines equipped with power lift or gravity lift down, refer to the Effectivity Page for machine serial number identification.*

Table 2-4. JLG SMART System™ Flash Codes - (Machines equipped with1600286 controller)

Code	Description
2-1	EMS inputs (both together, or neither).
2-2	Platform Controls
2-3	Ground Controls.
2-4	Steering (digital) inputs.
2-5	Cut-out input ((OK but indicated).
3-1	Line contactor open circuit.
3-2	Line contactor welded.
3-3	Line contactor (or other) driver short circuit (or tripped).
4-2	Temperature cut back.
4-4	Battery supply voltage out of range.
7-7	Motor/Motor wiring faulting.
9-9	Controller Failure

Analyzer Menu Structure for 1600286 Controller

In the following structure descriptions, an intended item is selected by pressing ENTER; pressing ESC steps back to the next outer level. The LEFT/RIGHT arrow keys move between items in the same level. The UP/DOWN arrow keys alter a value if allowed

Table 2-5. Analyzer Menu Structure (Machines equipped with 1600286 controller)

TOP LEVEL MENU	SUB LEVEL MENU	ITEM TO BE VIEWED OR CHANGED	DESCRIPTION DISPLAY
HELP;PRESS ENTER	HELP LOGGED HELP		Displays current help/fault message Log of most recent help/fault messages: LEFT/RIGHT view
DIAGNOSTICS	ASPC IN...		Displays current controller mode. NEUTRAL/DRIVE/FORWARD/LIFT/etc.
	PLATFORM	JOYSTICK	Displays joystick demand 0%...100% Preceded by "+" for forward/up/out, or by "-" for reverse/down/in.
		STEER	Displays steer status. (NONE/LEFT/RIGHT/etc)
		POSI-TRAC	Displays posi-trac switch status (OPEN/CLOSED)
		HIGH DRIVE	Displays high drive switch status (OPEN/CLOSED)
		DRIVE	Displays drive mode select switch status (OPEN/CLOSED)
		LIFT	Displays lift mode select switch status (OPEN/CLOSED)
		DECK	Displays deck mode select switch status (OPEN/CLOSED) Not displayed if POWER DECK = NO
	GROUND	UP	Displays ground lift up switch status (OPEN/CLOSED)
		DOWN	Displays ground lift down switch status (OPEN/CLOSED)
		OUT	Displays ground deck out switch status (OPEN/CLOSED) Not displayed if POWER DECK = NO
		IN	Displays ground deck in switch status (OPEN/CLOSED) Not displayed if POWER DECK = NO
	SYSTEMS	BATTERY	Displays measured battery voltage NOTE: Only accurate when line contactor closed
		TEMPERATURE	Displays measured heatsink temperature
		PUMP VOLT	Displays calculated pump motor voltage
		PUMP AMP	Displays calculated pump motor current
		ELEVATION	Displays elevation cutout switch status (OPEN/CLOSED) Closed with platform fully lowered

Table 2-5. Analyzer Menu Structure (Machines equipped with 1600286 controller)

TOP LEVEL MENU	SUB LEVEL MENU	ITEM TO BE VIEWED OR CHANGED	DESCRIPTION DISPLAY
DIAGNOSTICS/SYSTEMS (Continued)		FUNCTION C/O	Displays function cutout switch status (OPEN/CLOSED) Not displayed if FUNTION CUTOUT=NO
		DECK	Displays function cutout switch status (OPEN/CLOSED) Not displayed if POWER DECK=NO
		DRIVE C/O	Displays function cutout switch status (OPEN/CLOSED) Not Displayed if DRIVE CUTOUT = NO
		POTH C/O	Displays pothole cutout switch status (OPEN/CLOSED)
		TILT	Displays tilt switch status (LEVEL /TILTED) Not Displayed if TILT SWITCH = NO
		ARMGAURD	Displays armgaurd cutout switch status (OPEN/CLOSED)
	DATALOG		
		ON	Displays total controller on time NOTE: Up to four minutes lost at switch-off
		DRIVE	Displays total controller drive operation time
		LIFT	Displays total controller lift operation time
		DECK	Displays total controller deck operation time NOTE: Not displayed if POWER DECK = NO
		PUMP	Displays total controller pump running time NOTE: Includes drive, lift up, deck and steer
		RENTAL	Displays total controller pump running time NOTE: Can be reset
		ERASE RENTAL (YES:ENTER,NO ESC)	Not available in level 3 ENTER resets rental datalog time to zero
		MAX. TEMP	Displays maximum measured heatsink temperature
		MIN. TEMP	Displays minimum measured heatsink temperature
		MAX BATTERY	Displays maximum measured battery voltage
	VERSIONS		
		ASPC	Displays controller software version
		ANALYZER	Displays analyzer software version

Table 2-5. Analyzer Menu Structure (Machines equipped with 1600286 controller)

TOP LEVEL MENU	SUB LEVEL MENU	ITEM TO BE VIEWED OR CHANGED	DESCRIPTION DISPLAY
ACTIVATE TESTS			Not available once tests are activated
	YES:ENTER,NO:ESC		ENTER activates system test
	RUN SYSTEM TEST (Machine must be fully lowered before running systems test)		ENTER starts system test
			Not available until tests are activated
			Displays messages while system test runs
			Some messages are prompts, requiring user intervention
			ENTER can be pressed if a fault has been noted and to continue the system test. NOTE: A flashing message is critical, and prevents the system test from running.
ACCESS LEVEL			Displays the current access level Level 3 - Personalities cannot be changed Level 1 - All personalities can be changed
	CODE		Allows access level password to be entered Use LEFT/RIGHT to select digit Use UP/DOWN to change digit Use ENTER to update access level
PERSONALITIES	DRIVE		
		ACCEL	Displays/adjusts drive acceleration
		DECEL	Displays/adjusts drive deceleration
		CREEP	Displays/adjusts minimum drive speed
		MAX FWD	Displays/adjusts maximum drive speed forward NOTE: Used when high drive not selected
		MAX REV	Displays/adjusts maximum drive speed reverse NOTE: Used when high drive not selected
		ELEVATED MAX	Displays/adjusts maximum drive speed elevated NOTE: Used when elevation or pothole cutout switches are limiting max speed
		POSI-TRAC	Displays/adjusts posi-trac engaged time-out
		HIGH DRIVE AMP	Displays /adjusts high drive motor overload current
		HIGH DRIVE	Displays/adjusts high drive motor overload time-out

Table 2-5. Analyzer Menu Structure (Machines equipped with 1600286 controller)

TOP LEVEL MENU	SUB LEVEL MENU	ITEM TO BE VIEWED OR CHANGED	DESCRIPTION DISPLAY
	LIFT		
		ACCEL	Displays/adjusts lift acceleration
		DECEL	Displays/adjusts lift deceleration
		CREEP	Displays/adjusts minimum lift (up) speed
		MAX UP	Displays/adjusts maximum lift (up) speed
		MAX DOWN	Displays if there is no lift down (gravity) Displays/adjusts for power down machines for maximum lift down speed
	DECK		
		ACCEL	Displays/adjusts deck acceleration
		DECEL	Displays/adjusts deck deceleration
		CREEP	Displays/adjusts minimum deck speed
		MAX OUT	Displays/adjusts maximum deck out speed
		MAX IN	Displays/adjusts maximum deck in speed
	STEER		
		STATIC	Displays/adjust steer speed NOTE: Used when not driving
		STEER/DRIVE SPEED COMP	Displays/adjusts steer compensation speed NOTE: Used as an additive when driving
	GROUND MODE		
		LIFT UP	Displays/adjusts fixed lift up speed
		LIFT DOWN	Displays if no power lift down NOTE: Adjustable for power down machines
		DECK OUT	Displays/adjusts fixed deck speed out NOTE: Not displayed if POWER DECK = NO
		DECK IN	Displays/adjusts fixed deck speed in NOTE: Not displayed if POWER DECK = NO
	MACHINE		
		CURRENT	Displays/adjusts maximum motor current NOTE: DO NOT ADJUST
MACHINE SETUP			Refer to pages 2-6 and 2-8

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