

SUNRISE UPGRADE KIT for LAI "SkillTester"

This upgrade is designed to suit the early model LAI Skill Tester machines. These machines have a Move Forward and a Move Right button, and no sound effects. The machine used an ELAUT 48 volt crane assembly and the EAV85 control board.

The upgrade board (Figure 1) directly replaces the old control board (Figure 2). No wiring changes or additional power supplies are required for this conversion.

These are the key features of the upgrade.

- Attract music, background music and sound effects.
- Six tunes are built in. A different tune plays for each game.
- Increased gripper coil power.
- Two stage claw power, stronger at pick up.
- Electronic controls for motor speed and claw power.
- Selectable feature avoids player lowering claw into prize chute.
- Nudge Mode, selectable.
- Self resetting fuses
- Motor and coil spike suppression transils are built into the board.
- Automatic fault monitoring and reporting.
- Pre-wired speaker, and speaker grille included.
- Simple plug-in installation, just fit the speaker and grille.
- Feature adjustments are set by DIP switch, no special programmer is needed.

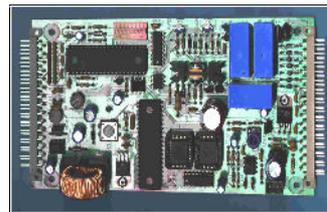


Figure 1

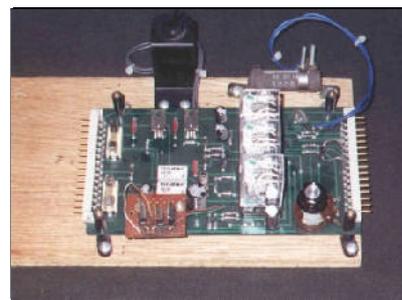


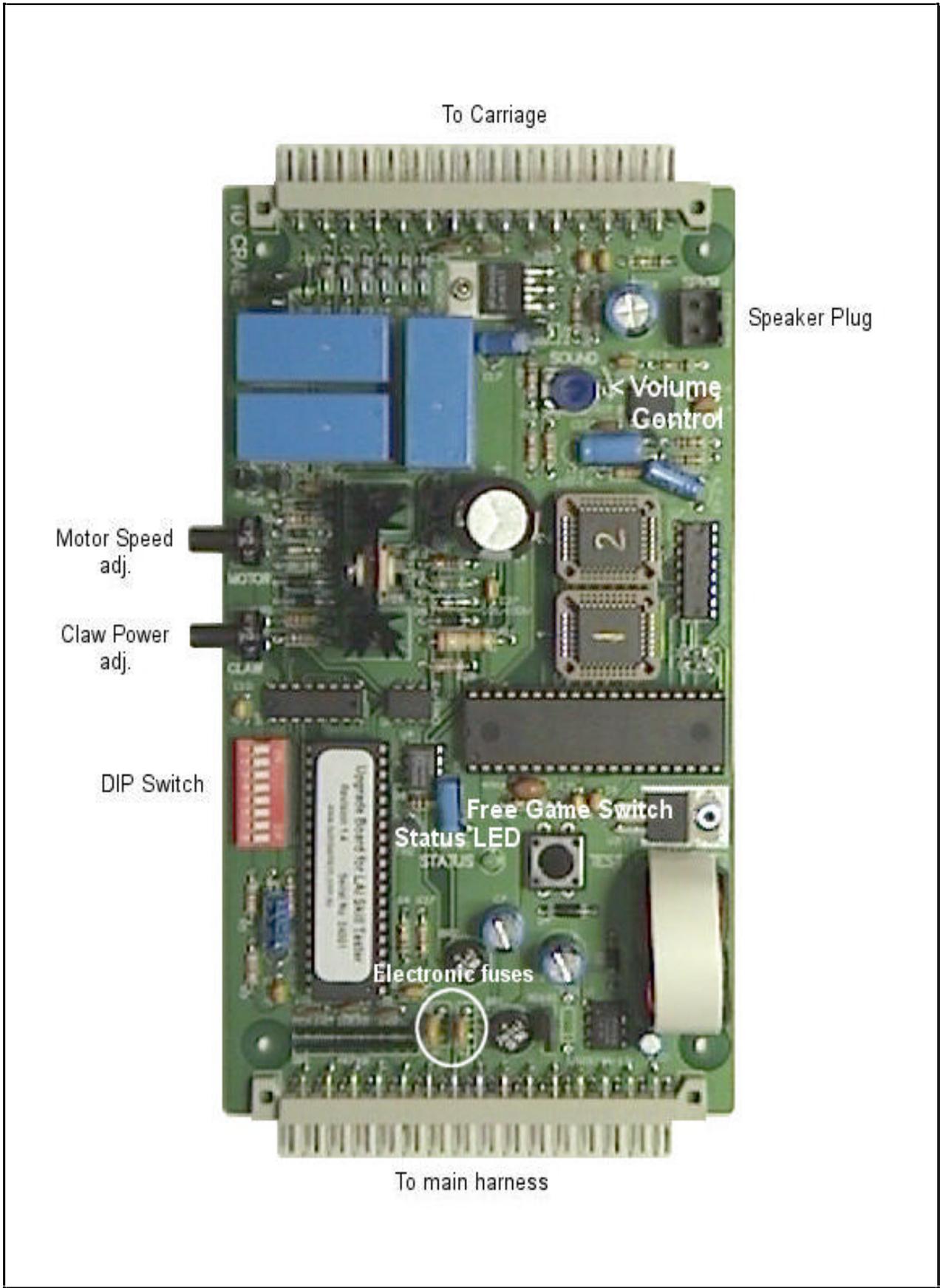
Figure 2

KIT CONTENTS

- 1 x SUNRISE Skill Tester UPGRADE BOARD.
- 1 x Speaker, pre-wired with plug and lead.
- 1 x Speaker grille and four security bolts.
- 1 x Self adhesive reference label.

Tools required

- Power tool with 40 mm hole saw attachment.
- 3/16" drill.
- Black paint for dressing up the speaker hole.
- Normal kit of screwdrivers etc.



PCB Layout

INSTALLATION AND SETUP

Removing the old control board.

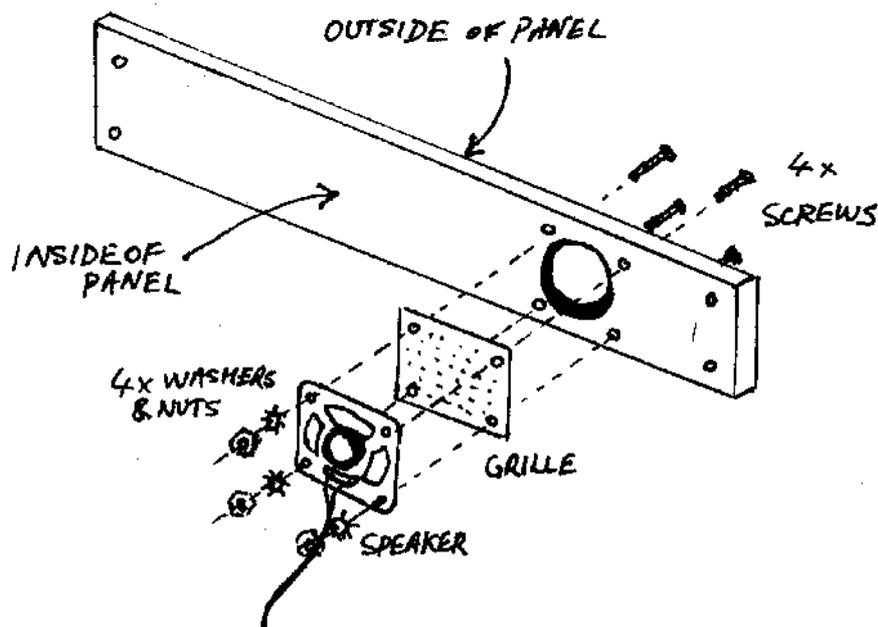
The old speed adjustment resistor and nudge switch and bracket should be removed with the old board.

Fitting the supplied speaker.

Using a hole saw, cut a 40 mm hole in the wooden panel below the control panel, at the front of the machine between the left side of the panel and the prize chute metalwork.

Working from the outside of the cabinet, center the speaker over the hole, and use it as a template to mark the four mounting bolt holes. Drill four 3/16" holes right through the panel.

Using the bolts supplied, attach the grille and speaker to the inside of the panel. Note that the grille goes on the inside of the cabinet. If desired, paint the surface of the cut-out before fitting the speaker and grille.



Fitting the new board.

Refer to the DIP SWITCH setting chart and set the DIP switches according to your preference. Mount the new board in place of the old. Note the PCB connector marked "CRANE", and plug the staggered pin connectors to each end of the upgrade board. Plug the speaker connector into the new board.

Switching on.

The crane should home itself and then perform the power on self test. If no errors are encountered, the crane will come to rest in the home position, the lamps will be off.

If the lamps are flashing, read the code from the error code table and make the appropriate repair.

Claw Strength adjustment.

When there are no credits, and the crane has returned to its home position, push the carriage forward and to the right. The claw will be turned on. Use the CLAW adjustment knob to adjust for the desired claw strength. Move the crane back to the home position when done, the claw will be de-activated.

Note: To prevent coil damage from the claw being left on too long, the carriage will automatically home itself after a preset timeout period.

Motor speed and sound volume adjustment.

On the control board, press the TEST switch to get a test credit. Operate the game and adjust the SOUND trim pot, located on the PCB close to the speaker connector. Adjust the MOTOR control knob to set the forward and right movement speed as desired. (The left and back speed is always controlled to be maximum speed.)

Testing coin input.

The transfer of credits uses the same method as was used for the original EA85 control board. Insert test coins and check for correct operation as follows.

For unmodified machines with a mechanical mech and a lockout coil.

A lockout coil is not really needed, however the original coil is left in place, this is how the credit system will work. The upgrade board DIP switch may be set for 1 or 2 coins per game. While the machine is standing by with no credit, the lockout coil is turned on. When the required number of coins have been inserted, the lockout coil turns off, preventing the insertion of further coins, or causing their rejection. The move button lamps light up and a game may be played. When the game is over, the lockout coil turns on, allowing coin to be inserted for the next game.

For machines with a mechanical mech and no lockout coil.

The upgrade board DIP switch may be set for 1 or 2 coins per game. When the required number of coins have been inserted, the lamps light up and a game may be played. Any excess credits will be stored by the upgrade board. When the game is over, the lockout coil turns on, allowing coin to be inserted for the next game.

For machines fitted with an electronic mech, a Sunrise Credit Board and LED credit display.

The skill tester upgrade board DIP switch should normally be set for 1 coin 1 play, with the coin / credit conversion settings done on the credit board DIP switch. As coins are added, the credit display shows the cumulative value of the coins and the resulting credit. When the first credit is gained, the credit board relay will pulse, sending 1 credit to the Skilltester upgrade board. The upgrade board releases the lockout output which floats to 12 volts inhibiting further credit pulses, lights the control panel lamps and plays the coin sound. Subsequent credits are stored in the credit board. After the game is over, the upgrade board pulls the lockout line to GND, allowing the credit board to release another credit pulse, and decrement the credit display.

DESCRIPTION OF OPERATION.

The detailed operation of the coins / credit entry system is detailed in the INSTALLATION AND SET UP section, under "Testing coin input".

1. Power on.

The crane is driven to its home position if not already in that state.

Power on self test is automatically performed. This includes a sequence where the crane is driven out through a typical game cycle. If no errors are encountered, the crane will come to rest in the home position, the lamps will be off. If the lamps are flashing, read the code from the ERROR CODE table and make the appropriate repair.

2. Standby, no credit.

If enabled by the **DIP switch**, the attract music will play periodically. A new tune is played each time. When sufficient coins have been inserted, the coin sound plays, and the machine goes to "Standby, with credit".

3. Standby, with credit.

The **MOVE FORWARD** and **MOVE RIGHT** lamps are lit. There is no sound. Upon pressing the move forward button, the game will go to either "Move Forward, no nudge mode", or "Move Forward, with nudge mode", depending on the **DIP switch** setting.

4a. Move Forward, no nudge mode.

The background music plays. A new tune is played for each new game. The crane moves forward while the Move Forward button is depressed. The machine will go to "Waiting for Move Right" when the Move Forward button is released, or when a timeout period has elapsed.

4b. Move Forward, with nudge mode.

The background music plays. A new tune is played for each new game. The crane moves forward while the Move Forward button is depressed and stops when the button is released. The machine will go to "Move Right" when the Move Right button is pressed, or when a motor-on timeout period has elapsed.

5. Waiting for Move Right.

When the Move Right Button is depressed, the machine goes to "Move Right".

6. Move Right.

The button lamps are extinguished. While the Move Right button is depressed, the crane is driven right. The machine will go to "Drop Claw and return" when the Move Right button is released, or when a timeout period has elapsed. When the **AVOID PRIZE CHUTE** option has been set on the **DIP switch**, if the crane has not moved far enough to clear the prize chute, it will be forced to continue moving to the right until it has done so.

7. Drop Claw and return.

The claw drop sound plays, the claw is lowered until the end of descent switch is activated. The end of descent sound plays and after a momentary pause, the claw energises, and is raised while the claw up sound plays. If the **DIP switch** option **2 STAGE CLAW POWER** is set, the claw will initially be energised at full power, and after a brief delay, revert to the power level set by the **CLAW** adjustment pot. When the **UP LIMIT** switch is activated, the up motor stops, the crane is driven left, and the background music plays. When the **LEFT LIMIT** switch is activated, the crane is driven back until the **BACK LIMIT** switch is operated. The motor and claw power is turned off, the claw opens and drops the prize. If there are no more credits, the machine goes to "Standby, no credit" and the background music continues to play until the end of the tune. If more credit is available, the credit is decremented, the music stops, the coin sound plays and the machine goes to "Standby, with credit".

DIP SWITCH SETTINGS

	1	2	3	4	5	6	7	8
Attract Sound off	OFF	ON						
Attract sound delay 20 sec	ON	OFF						
Attract sound delay 50 sec	OFF	OFF						
Attract sound delay 2 min	ON	ON						
Nudge Mode off			OFF					
Nudge Mode on ^A			ON					
1 coin 1 play				OFF				
2 coins 1 play				ON				
1 stage claw power					OFF			
2 stage claw power ^B					ON			
Avoid prize chute ^C						ON		
Don't avoid prize chute						OFF		
Up / Down sound low volume							OFF	
Up / Down sound high volume							ON	

- A. The Move Forward button can be used for moving forward incrementally.
 B. The claw will have full power when it first closes, and gradually drop back to the pre-set power as it rises.
 C. This is designed to reduce the possibility of claw theft. If the crane has not moved far enough to clear the prize chute before the claw is to drop, it will be forced to continue moving to the right until it has done so.
 Note: Avoid Prize Chute is a timed function, and may not operate efficiently if the motor speed has been set too slow.

Recommended dip switch settings: 1,2,4,7,8 OFF, and 3,5,6 ON.

FAULTS AND ERROR CODES

Self testing checks are performed by the upgrade board computer on power up and during the game cycle. If errors are detected the machine may be immediately stopped at that point in the cycle, while continuously flashing an error code on the control panel lamps and on the upgrade board **STATUS LED**.

Error Codes

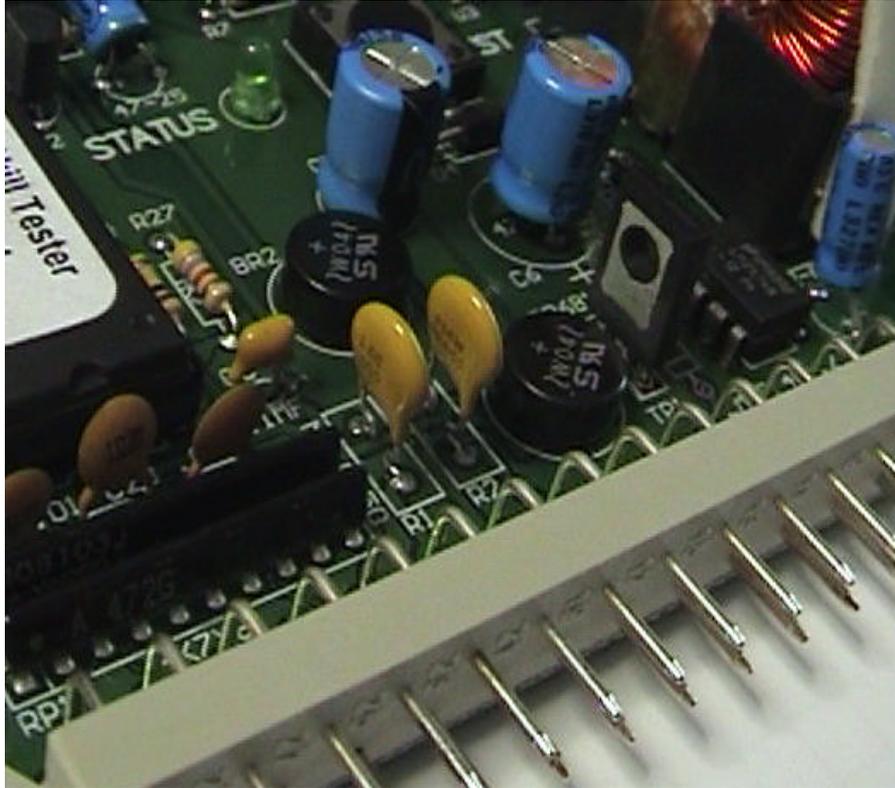
Errors are interpreted by counting the number of flashes of the panel lamps or upgrade board **STATUS LED**. There will be a longer pause, followed by a sequence of flashes. Count the number of flashes to get the error code and consult the following error code list.

Note that an item mentioned as being in error may in itself not be at fault. For example, a broken connection on the forward/back motor may cause an error 4. Because the motor did not operate the allowed return time expired and therefore the expected limit switch closure did not occur.

1. Move forward button stuck on (tested at power up).
2. Move right button stuck on (tested at power up).
3. Left home switch not closing, or up limit switch wrongly in down position.
4. Back limit switch not operating.
5. Down limit switch stuck or not operating.
6. Up limit switch stuck on.
7. Curly cord broken or coil open circuit.
8. Back limit switch not closing or up limit switch faulty.

Fuses

There are no replaceable fuses on the control board. The 24/48 volt transformer and motors are protected by two **500mA polyfuse** devices. **R1** protects 24v and **R2**, 48v. In case of an overload, these devices become quite hot and limit the current to a safe value. When the cause of the overload is removed, they cool after a few seconds and allow normal operation. Some potential causes of overload are a short in the grab coil or its wiring, a jam locking or slowing a motor rotor, a faulty control board.



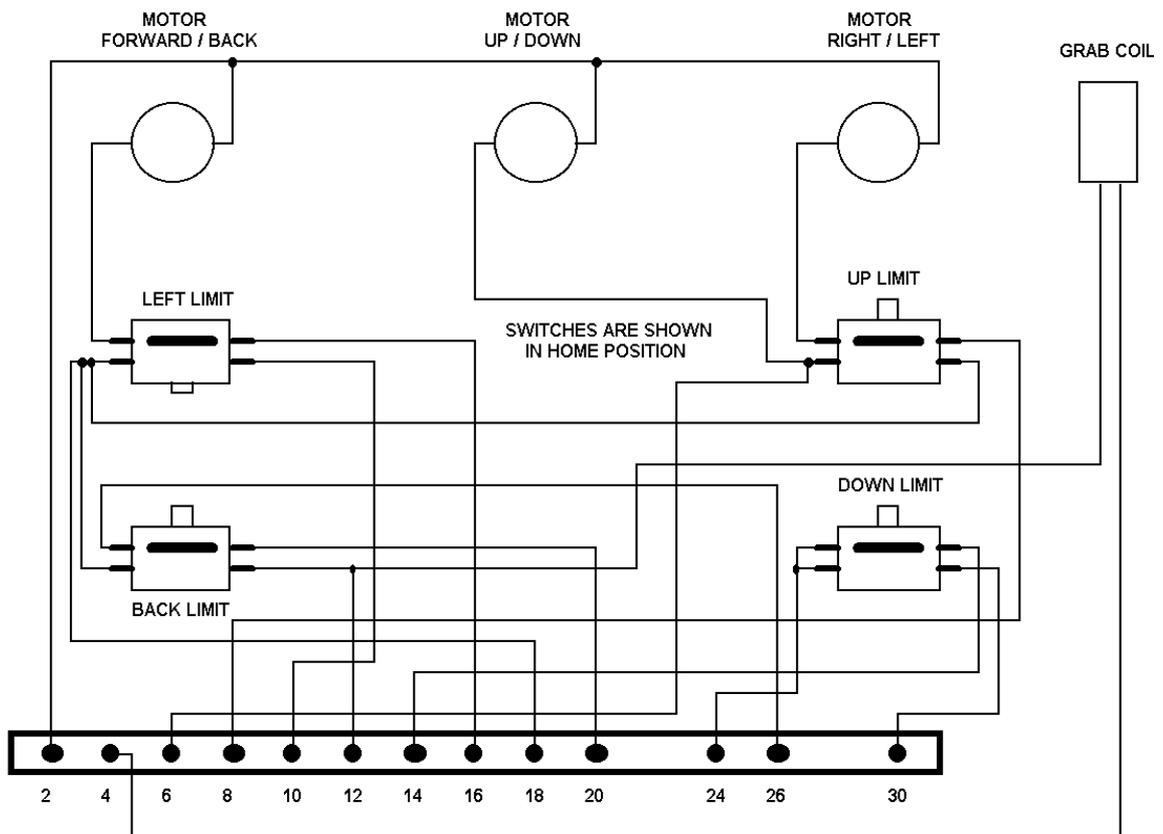
Electronic fuses R1 and R2 at centre of photo.

Claw volt meter (for reference only)

Some operators find it useful to have a volt meter permanently installed in a Skill Tester machine to enable easy standardised adjustment of the claw power when rotating to different types of prizes. The optimum voltage setting for each type of prize is written down for future use.

Connections are available for a meter. Fitting a meter requires removal of the cover from the CRANE connector to allow the soldering of two wires. A 50 volt panel meter, such as part no Q0538 from Altronics, could be used. Solder a wire from the meter (+) to pin 13 of the CRANE connector, and from the meter (-) to pin 5 of the connector. It is a good idea to install a 2 pin connector in the meter wires so that the crane assembly can be easily removed for maintenance

ELAUT 48v CRANE ASSEMBLY WIRING DIAGRAM (for reference only).



UPGRADE BOARD CONNECTOR PINOUT (for reference only).

Pins with same description are linked together on the PCB. Pins omitted have no connection

CN1 (From transformers)

1. Move forward input
2. GND
3. Move forward input
4. " "
8. GND
9. Coin counter output. (Open collector.)
10. 48v AC (1)
11. Lockout output. (Open collector.)
12. Coin input
13. " "
14. GND
15. "
16. 48v AC (2)
17. GND
18. 24v AC (1)
19. GND
20. 24v AC (2)
21. GND
22. Lamp output (open collector)
23. GND
24. "
25. "
27. Coin input
28. Move right input

CN3 (To crane assy)

2. Motor power output
4. Claw power output
5. " "
6. Up/Down motor output
7. Left limit switch input
8. Left/Right motor output
9. Left limit switch input
10. " "
12. Claw output
13. "
14. Down limit switch input
16. Forward/Back motor output
18. GND
20. Back limit switch input
24. GND
26. GND