MANUAL 6000

PRICE $4.95

AN INTRODUCTION TO Bally®

SLOT MACHINES

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INTRODUCTION

It is the purpose of this outline to summarize the essential components that make up a slot machine. It is written primarily to provide a foundation and background for the persons who service these games. No one can hope to memorize every detail of every circuit and component in today's great variety of games, a good technician does not even attempt it. Instead, they should be able to obtain information as it is needed from the instruction sheets, drawings and schematics provided with each particular game. To do this, they must be able to read and interpret the schematic diagram. The ability to read a drawing, coupled with the basic principles of electricity, will make it much easier to understand, adjust, operate and repair any game or electrical device.

UNDERSTANDING SCHEMATIC CIRCUITS

The schematic circuit is a complete drawing of all the individual electrical circuits. A shorthand system of symbols and lines are used to represent switches, coils, fuses, etc. The lines indicate how the components are connected together or not.

A knowledge of the mechanical movement of the components that actuate the various switches is necessary. Not all the switches of a component assembly are close together on the schematic drawing. The switches of an assembly are divorced and shown individually in only that circuit in which they are used.

At first glance, the schematic may look complicated but actually it is nothing more than a collection of many simple circuits, each designed to do a particular job. In trouble shooting, it is important to isolate the problem. Reference to the schematic is then made only to those circuits that apply.

TROUBLE SHOOTING

Never experiment with any of the mechanisms. Improper adjustment or makeshift repair, will only cause serious damage to other parts of the machine, or repeated failure of the part.

To service any slot machine in a minimum of time, it is necessary to isolate the problem to a particular circuit. A system of logical elimination will isolate the trouble spots. This is done by attempting to play the game and observing the results. With a little reasoning, a brief reference to the schematic and, perhaps, a continuity check, will inevitably determine the cause.

A visual inspection of the components in the possible trouble area may often save time. Always look for a possible loose wire, bad connection at the plug or socket, and broken or unhooked springs on step-up unit assemblies, relays, etc.

SAFETY

Certain safety requirements should be kept in mind when a slot machine is serviced. It is important to remember that current is the electrical shock factor rather than the amount of voltage. Current flow is equal to the voltage divided by the resistance. When the skin is wet or moist the contact resistance may drop to as low as 300 ohms. With this low body resistance even a relative low voltage can supply enough current to be fatal. Do not work on any electrical equipment with wet hands or while wearing wet clothing or wet shoes. While servicing any machine shoes with well insulated soles and heels should be worn.

Cleaning solvents require certain safety precautions also. Volatile liquids such as benzol, turpentine and kerosene can be dangerous because of the possible igniting of fumes by a spark. If these liquids are to be used, be sure the game is turned off, and that there is sufficient ventilation to avoid an accumulation of fumes, and that all fumes are cleared before the game is turned on.

Carbon tetrachloride, although it does not create a fire hazard is dangerous because of the ill effects of breathing its vapor. It may result in headache, nausea or dizziness. In a poorly ventilated space it can cause unconsciousness or even death.

Available at many local electrical or radio supply houses are many commercial solvents for electrical and mechanical equipment. These leave no residual deposits, are non-flammable and come in convenient spray cans.

TERMS AND DEFINITIONS

ACTUATOR
That portion of a device that operates a switch.
ADJUSTMENT
The spacing of contacts on switch blades in a switch assembly. The placement of certain levers, pawls, stop brackets, etc.
ARC
The discharge of electrical energy thru a gas, such as air.
ARMATURE
A movable piece of metal attached to a relay and it is attracted by a magnetic field.
BACK UP BLADE
An auxiliary blade to dampen the vibrations of its adjoining blade.
BANK
A number of relays mounted into a common assembly (commonly referred to as a relay bank).
BLADE
A highly conductive spring type metal in the use of a switch leaf.
BURNISHING TOOL
A non-abrasive strip coated with minute particles of metal used to clean switch contacts.
CAM
A metal, plastic, or bakelite disc, with notched dwells or lobes, attached to a motor shaft or extension of a motor shaft. The disc operates associated switches when the motor is operating.
CAPACITOR (OR CONDENSER)
An electrical device used to store electrical energy.
CIRCUIT
A closed network of conductors through which an electric current can flow.
CLOCK
Controls the timed return action of the timer shaft after the reels kick off.
COIL
Multiple turns of insulated wire wound on a spool used to create a magnetic field when energized by an electrical current. (Contains a stationary core plug)
COIL STOP (OR CORE PLUG)
A small assembly which is used as a stop for the solenoid plunger.
COIN MECHANISM
Mechanism that tests a coin for size, weight and material content before passing it thru to actuate the coin switch.
COIN LOCK-OUT COIL
A device mounted on the coin chute assembly that allows coins to drop to the coin chute when the coil is energized. When not energized, the coins are rejected and returned to the player.
CORE
The stationary soft iron in the center of a coil winding as in a relay or transformer.
C-R RELAY
Compact relay enclosed in a plastic casing. It is a plug-in type of relay assembly which has 4 single pole double throw type switches.
CURRENT
The flow of electrons caused by an electrical force called voltage. The amount that will flow for a given voltage is dependent on the electrical impedence of the circuit. The unit of measurement of current is ampere.
DIODE (OR RECTIFIER)
Passes a great deal of current in one direction (anode to cathode) and a minimum amount of current in the opposing direction (cathode to anode).
DISC
The stationary bakelite piece to which rivets or etched copper laminate is attached. Used on step-up units, drum units, motor units, etc.
DRIVE ARM
The step-up lever that is operated by the solenoid plunger to advance the ratchet gear.

DRIVE PAWL
Attached to the drive arm, it engages the next tooth of the ratchet gear to advance when the solenoid is de-energized. Advancing the ratchet is done by a spring connected to the drive arm and drive pawl.

ELECTRIC DOOR LOCK
Mechanism for locking the door lock slide guide.

ESCAPEMENT PAWL
Used to reset the stepping unit one step at a time. It allows the ratchet to return only one position when the reset pawl is disengaged.

GAP
Air space between a set of contact points.

HINGE SWITCH
The switch operated by the hinge when the door is open or closed.

INSERT (OR TOP SHELF)
The panel mounted above the reel mechanism on which step-up units, lites, relays, and other units are mounted.

INSULATOR
A material that does not conduct electrical current.

INTERLOCK RELAY
A relay consisting of two coils whose armatures are mutually locked in mechanically.

KEY SWITCH
One or more switches mounted internally to the cabinet and activated by an external key.

LATCH
A mechanically locking device.

LINK
Connecting arm betweem two moving parts.

LOCK ARM
A mechanical latch device on a step-up unit to insure full return (index) of the ratchet upon reset. Sometimes called a catch pawl or a reset latch.

LOCK-IN
A term applied when a relay is kept energized thru a switch of its own after the original source of energy has been removed.

MAGNET COIL
A coil of wire wound around a bobbin of plastic such as a relay coil.

METER
Counter

PLUNGER
A soft iron rod that is attracted to the solenoids' magnetic field. This movement is linked to do mechanical work.

RATCHET
A circular notched (geared) piece of metal or plastic used to rotate a wiper on a step-up unit.

REJECTOR (OR ACCEPTOR)
See Coin Mechanism.

RELAY
A coil of wire with a soft iron core which when energized attracts the relay armature which actuates the switch actuator. This in turn operates the relay switches.

RESET PAWL
Holds the step-up unit ratchet in position between step-ups so that the wiper assembly is centered on contacts. Also prevents the ratchet from resetting between step-ups on a reset type unit. Sometimes referred to as an index pawl.

RESIDUAL
The unwanted, left over magnetism that remains in an armature or plunger after the electrical energy has been removed from the plunger or armature.

RESISTANCE
Property of matter that restricts or impedes the flow of electrical current. Measured in units called ohms.

RESISTOR
An electrical device which is used to limit the flow of electricity (an electric circuit element used to provide resistance).

SCHEMATIC
Drawing showing complete wiring of all components by means of a shorthand system of symbols and lines.

SEQUENCE
A definite predetermined pattern or order of operation.

SLAM TILT
Switch assembly with an attached weight to the end of the operating blade, so that the switch will open when the game is jarred or bounced.

SLEEVE
A replaceable liner inside a solenoid.

SOLENOID
A spool of insulated wire with a hollow core into which a plunger is magnetically attracted when a solenoid is energized.

STEP-UP UNIT
An electrically and mechanically driven rotary type of switching unit.

SWITCH SPACERS
Small bakelite pieces separating one switch blade from another.

TORSION SPRING
A spring attached to the stepper unit ratchet & pivot pin. The spring tightens as the unit advances. (A spring that stores energy in a rotational direction rather than a linear direction).

TOWER
Mounted on top of the cabinet. (It is used for a jackpot win indicator and a service lite).

TOP SHELF
See Insert

TRANSFORMER
An electrical component consisting of two or more coupled windings, with or without a magnetic core for inducing mutual coupling between circuits. Primarily used to change voltage ratios up or down by the process of electro-magnetic induction.

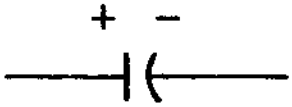
WIN METER
A meter which will display the amount of coins paid. It is resettable at next handle pull.

WIPER ASSEMBLY
The rotating contact blades that complete the circuit through a step-up unit disc assembly.

WIPER LEVER ARM ASSEMBLY
Finger type wipers which are attached to the index lever arm assemblies. They complete the win circuit through 1 or more reel contact discs when a pay combination is lined up on the pay line.

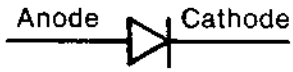
SYMBOLS

Ballast

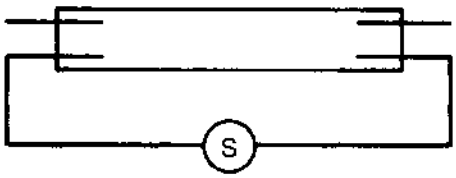


Capacitor or Condenser

Coil (relay coil or solenoid)



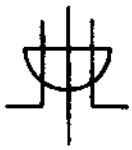
Diode or Rectifier



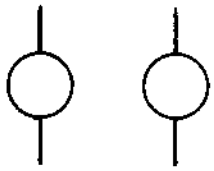
Flourescent lamp
with starter

Fuse

Grounding connection



Line plug



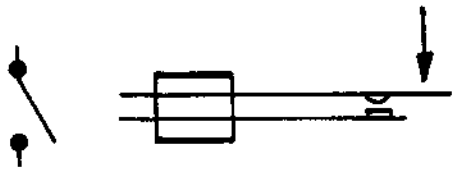
Lites

Motor

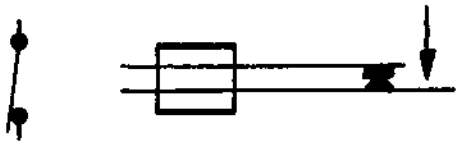
SYMBOLS

Odds motor cam operated switch.

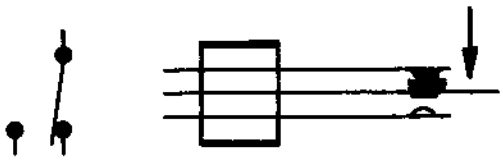
Resistor



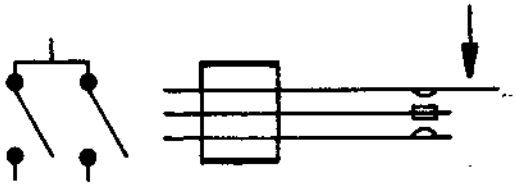
Normally open, closed when energized make switch.



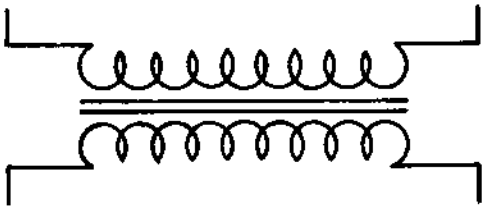
Normally closed, open when energized, break switch.



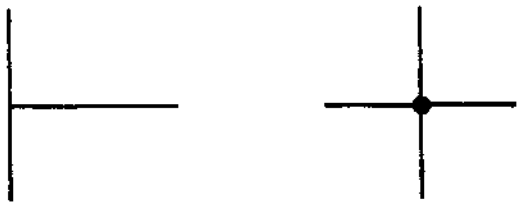
Transfer, make-break switch.



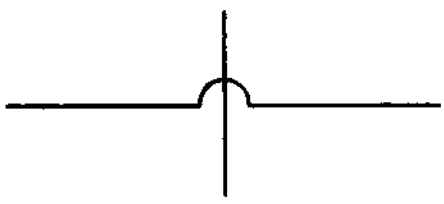
Double make-make switch.



Transformer



Wires connected



Wires not connected

BALLY WIRE COLOR CODE

1.	Red	(-R-)
2.	Blue	(-Blu-)
3.	Yellow	(-Y-)
4.	Green	(-G-)
5.	White	(-W-)
6.	Brown	(-Br-)
7.	Orange	(-O-)
8.	Black	(-B-)
9.	Gray	(Gray)
O.	No Tracer	
J.	Jumper	

First number = wire body color

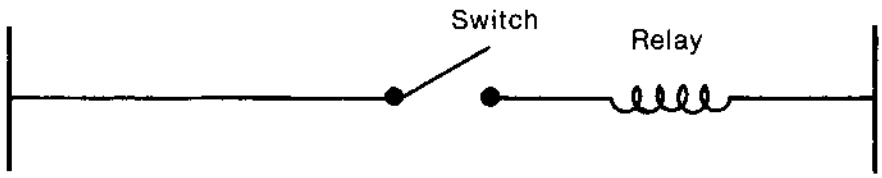
Second number = tracer color

Third number after dash = re-use of same color wire (in a different circuit).

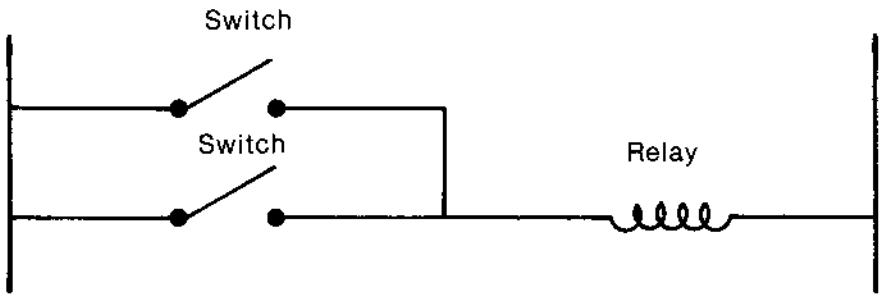
EXAMPLE:

50 = White wire with no tracer
51 = White wire with red tracer used 1st time
51-1 = White wire with red tracer used 2nd time
51-2 = White wire with red tracer used 3rd time

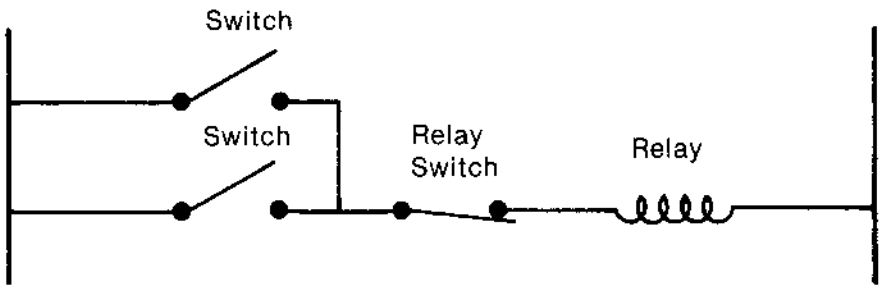
BASIC CIRCUITS



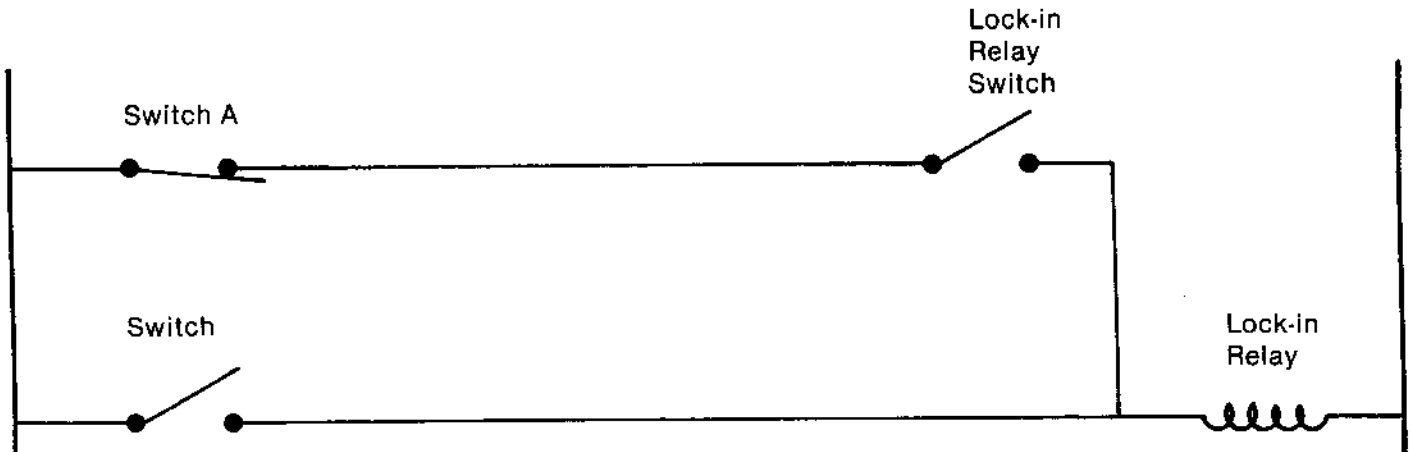
EXAMPLE #1:
This is the simplest method of energizing a relay. The relay is pulled in only as long as the switch is closed.



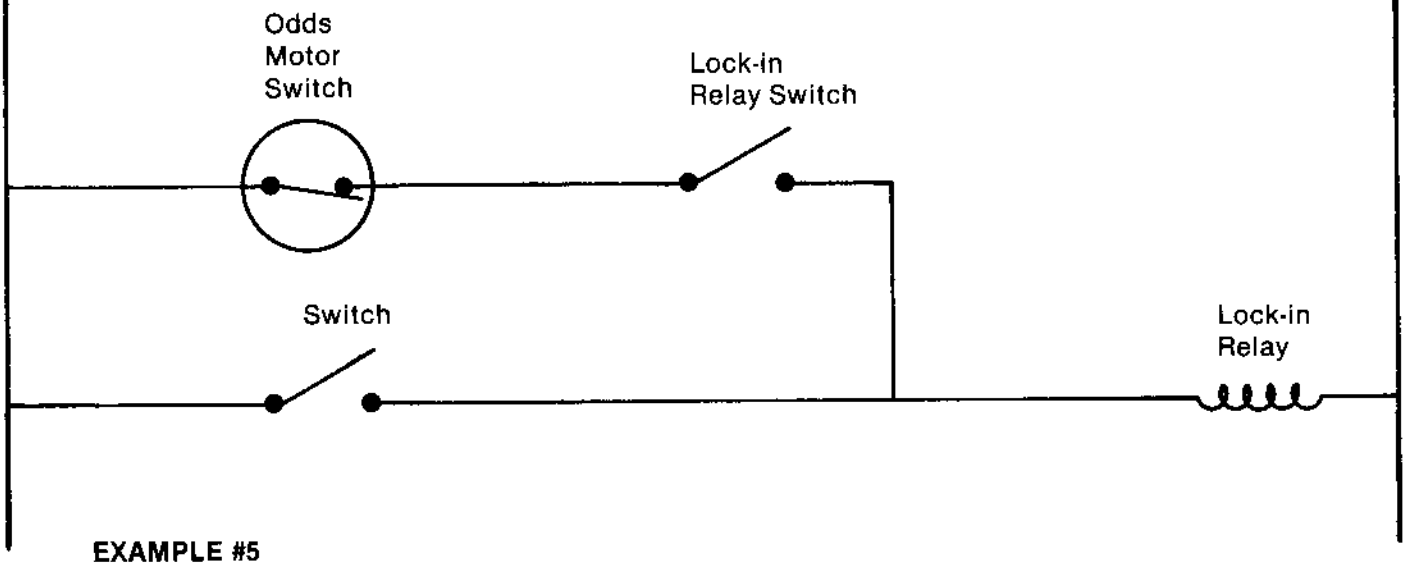
EXAMPLE #2:
The operation of Example #2 is identical with Example #1 except that either switch will pull in the relay.



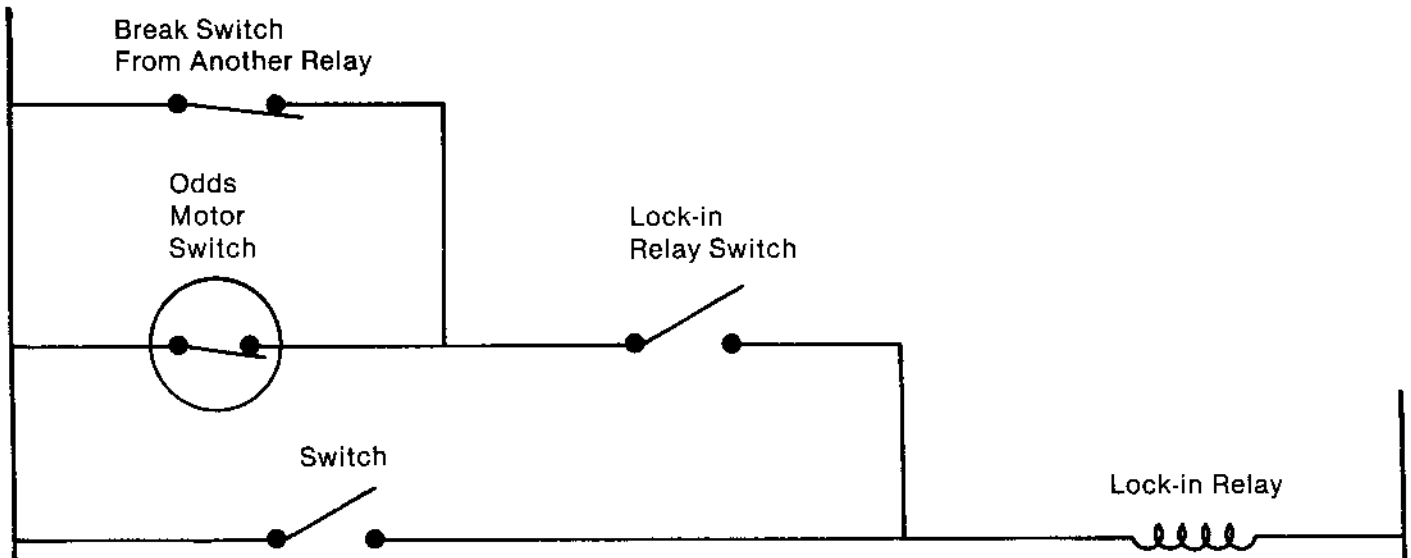
EXAMPLE #3:
The only difference with Example #3 from #2 is that the relay switch must be closed to complete the circuit.



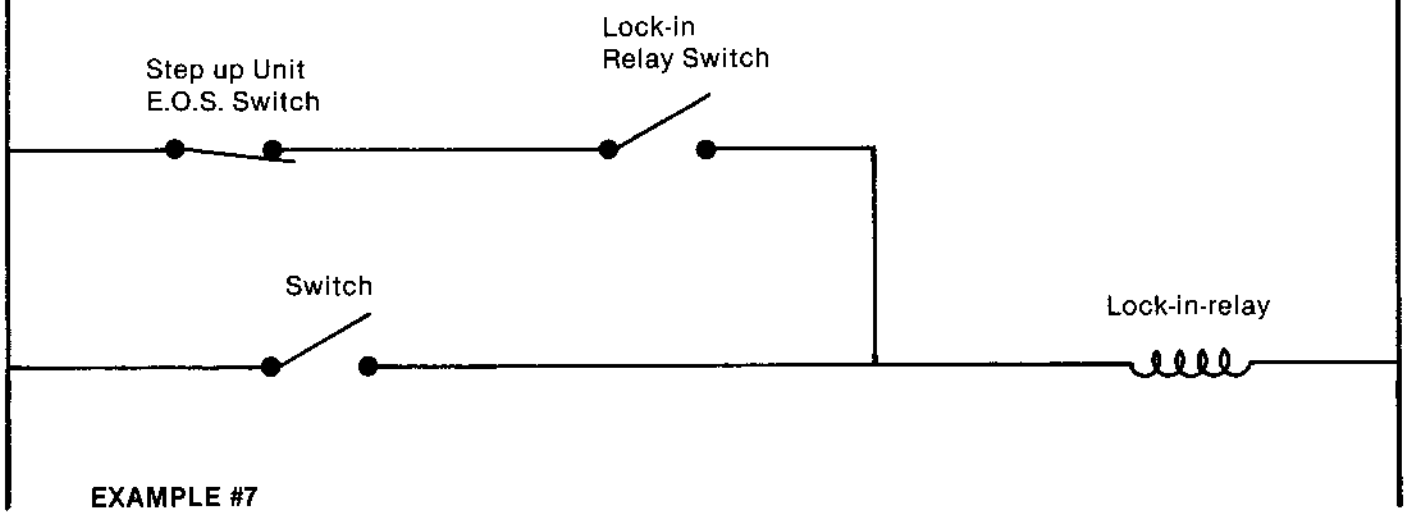
EXAMPLE #4
This is the basic form of a lock-in or hold relay. Once the relay is energized, the only way to de-energize it would be to open the switch A.



EXAMPLE #5
This lock-in circuit will drop out whenever the odds motor turns.



EXAMPLE #6
In this circuit, the relay will not drop out with each odds motor cam index. The drop out will be delayed because of switch in parallel with the odds motor switch. The break switch from the other relay must open before and remain open until after the motor pulse.



EXAMPLE #7
The relay is locked in through a step up unit end of stroke switch. The step up unit must advance for the relay to drop out. A typical example of this circuit is in the odds relay lock-in circuit.