

Aircraft testing circuits

Dr. Naser. F. AB. El MajdouB1, Dr Mohamed Amer
Abomhdi 2

1(Technical College of Civil Aviation and Meteorology Tripoli: Libya)

Department: Aircraft Maintenance Engineering Higher Institute of Science and Technology .ALAjailiat))

2 Department: Electrical and electronic department

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ABSTRACT

We will written about some "testing circuits" for all circuits operation for all 28 v d.c. These circuits are navigation light anti- collision lighting-inverter - fuel pump.

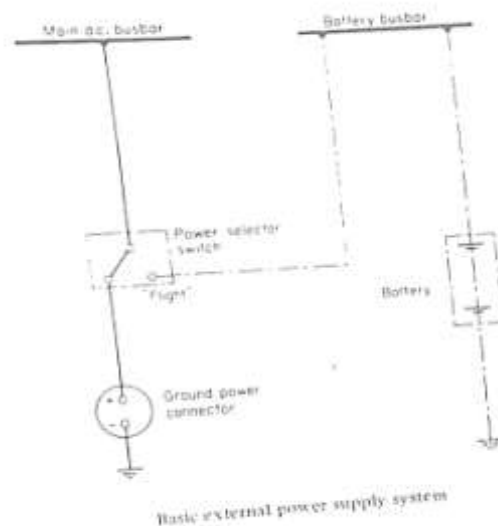
Also information about main d.c. bus bar and circuits protection devices and circuit controlling devices too diagram of these circuits also electrical trouble shooting and trouble shooting equipment - conclusion and reference

I. INTRODUCTION

Main Parts

D.C. Bus Bar.1

Aircraft bus bar system. The output from generators, batteries and other sources is connected to low impedance conductors called bus bars various consumers or loads then connected to these bus bars.



CIRCUIT PROTECTION DEVICES

In the event of as hot circuit an overload other fault condition occurring in the circuit formed by cables and components of an electrical system, it is possible for extensive damage and failure to result for example, if the excessive current flow used by a short circuit at some section of a cable is left un-checked the heat generated in the cable will continue to increase until something gives way.

FUSES

A fuse is a thermal device designed primarily to protect the cables of a circuit against the flow of short circuit and over load currents.

CURRENT LIMITERS

Current limiters as the name suggests, are designed to limit the current to some per determined amperage value.

LIMITING RESISTORS

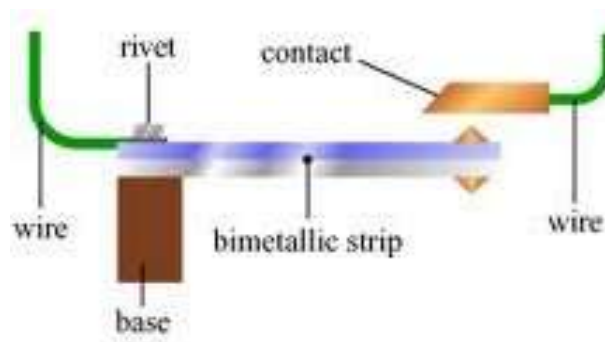
These provide another form of protection particularly in d.c. circuits in which the initial current surge is very high e.g. starter motor and inverter circuits. Circuits containing highly-capacitive loads

CIRCUIT BREAKERS

Circuit breakers, unlike fuses or current limiters, isolate faulted circuits and equipment by means of a mechanical trip device activated by the heating of a bi-metallic element through which the current passes to a switch unit. We may therefore consider them as being a combined fuse and switch device

-CIRCUIT CONTROLLING DEVICES

In air craft electrical installations the function of initiating and subsequently controlling the operation sequences of constituent circuits is performed principally by switches and relays, and the construction and operation of some typical devices.



PUSH-SWITCHES

Push-switches are used primarily for operation of short duration. ie. when a circuit is to be completed or interrupted momentarily or when an alternative path is to be made available for brief periods.

ROCKER-BUTTON SWITCHES

ROCKER -Button switches combine the action of both toggle and push-button type switches and are utilized for circuit control of some systems and equipment.

ROTARY SWITCHES

These are manually operated, and for certain operating requirements they offer an advantage over toggle switches in that they are less prone to accidental of eccentric device to give a snap

* SWITCHES

In Its simplest form, a switches consists of two contacting surfaces which can be isolated from each other or brought to gather as required by removable connecting link. This connecting link is referred to as a pole and when it provides a single path for a flow of current the switch is designated as a single-pole, single-throw switch.

the term throughthus indicates the number of circuits each pole can complete through the switch in many circuits various switching combinations are usually required in order to facilitate the make and break operations the contact assemblies of switches ((and certain relays)) may be constructed as integrated units

II . MATERIAL AND METHODS

TYPES OF SWITCHES

TOGGLE SWITCHES

Toggle or tumbler-type switches as they are sometimes called. perform what may be regarded as ((general-purpose)) switching function and are used extensively in the various circuits.

action and positive engagement of the contact surface

MICRO-SWITCHES

Micro switches are a special category of switches and are one of the most extensively applied electrical devices in the aircraft, performing a wide range of operations to ensure control of a variety of systems and components

RHEOSTATS

These are controlling devices containing a resistance the magnitude of which can be varied, there by adjusting the current in the circuit in which it is connected.

TIME SWITCHES

Certain consumer services are required to operate on pre-determined controlled time sequence basis and as this involves the switching on and of various components or sections of circuit switches automatically operated by timing mechanisms are necessary.

"MERCURY SWITCHES

Mercury switches are glass tubes into which stationary contacts, or electrodes and loose mercury are hermetically sealed.

THERMAL SWITCHES

Thermal switches are applied to systems in which a visual warning of excessive temperature

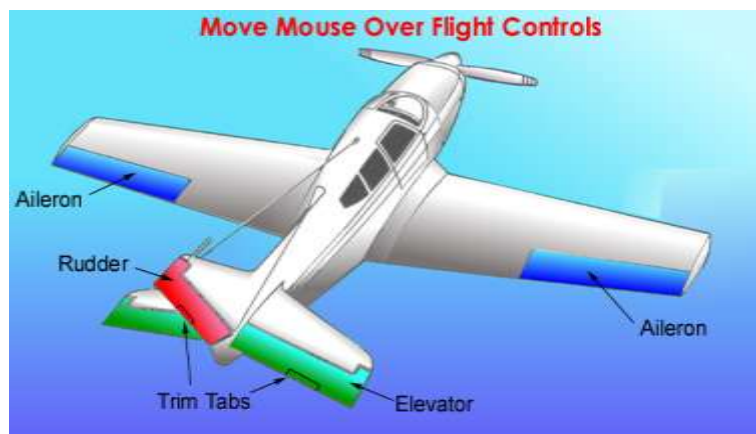
control and automatic operation of protection devices are required.

* PRESSURE SWITCHES

In many of the aircraft systems in which pressure measurement is involved, it is necessary that a warning be given of either low or high pressure which might constitute hazardous operating conditions

THERMAL SWITCHES RELAYS

Relays are in effect, electromagnetic switching devices by means of which one electrical circuit can indirectly controlled by a change in the same or another electrical circuit.



TYPES OF RELAYS

- 1- HEAVY-DUTY RELAY
- 2-LIGHT-DUTY RELAY
- 3-POLARIZED ARMATURE RELAYS
- 4-SLUGGED RELAYS

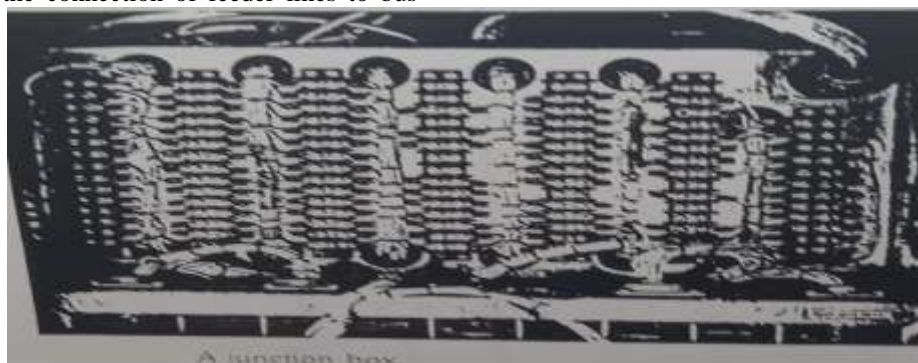
BREAKERS

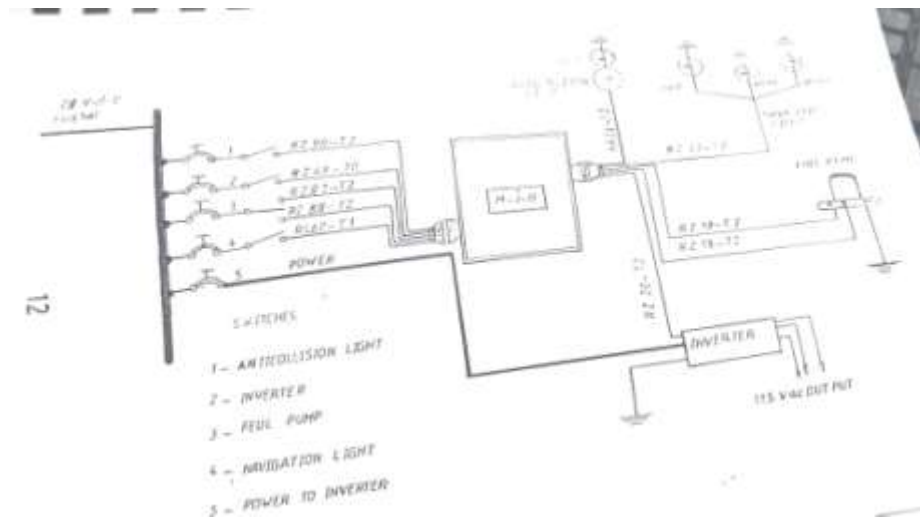
These devices sometimes referred to as contactors, are commonly used in power generation systems for the connection of feeder lines to bus

bars and also for interconnecting or "tying" of bus bars

JUNCTION BOXES

Junction boxes may be constructed of any strong nonabsorbent fire resistant material, such as Aluminum alloy, Fiberglass, Formica, or Stainless steel. Stainless steel is recommended when the installation must be Fireproof





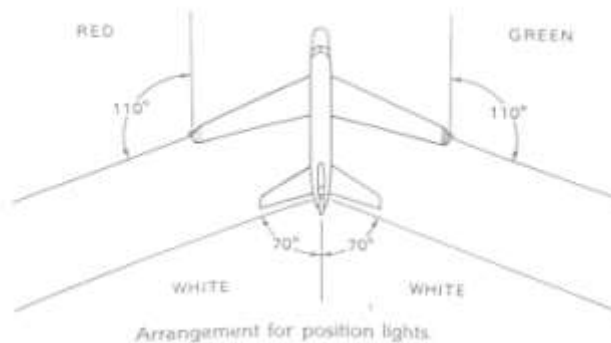
III. RESULTS AND DISCUSSION

TESTING CIRCUITS

POSITION OR NAVIGATION LIGHTS

Each air craft must have three position lights: two forward and one aft forward position light are usually mounted on the tips of the wings

because they are required to be as far out ward as possible the right position light is green and the left is red the forward position lights must show light through a ((110°)) angle from directly for ward to the right and the left as shown in the fig down.



The Aft light is white and mounted as far to the rear as possible. It is common practice to mount the aft position light on the top of the vertical stabilizer. The aft position light must show through an angle of ((70°)) one each side. The electrical power required for the lights is normally ((28)) volt d.c., but in several current types of ((all a.c.)) aircraft the lights are supplied with 28 volts a.c. consist of Filament type lamp and the light is flash

ANTI COLISION LIGHTS

Ant collision lights also fulfills a position marking function and in connection with navigation lights giving steady lighting

permits the position of an air craft to be more readily determined lighting system may be of the type which emits a rotating beam of light or of the strobe type which short-duration flashes of high intensity light are emitted in some current types of air craft both methods are used in combination the strobe lighting Remaining what is termed ((Supplementary Lighting))

Rotating Beam lights

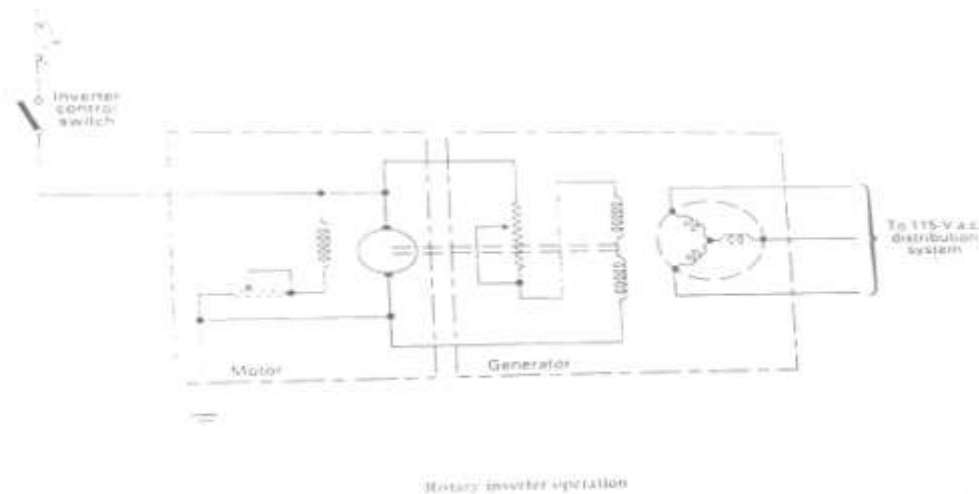
Consist of Filament lamp unit and motor.

The power required for beacon operation is normally 28 volts d.e. but number of types are designed for operation from an ((a.c.)) supply the

motor requiring ((115)) volts and the lamp unit ((28)) volts supplied via a step. Typical speeds are ((40-45)) RPM Giving a frequency of ((80-90)) cycles per minut. ..Strobe lighting this type of lighting system is based on the principle of Capacitor discharge flash tube

ROTARY INVERTER

It consists of d.c. motor and a.c. generator set.
 D.C. Motor operated on ((28)) volt d.c. supply..1
 2. A.C. generator. Either a rotating armature with three slip ring for a.c. output



The most widely known device under this heading is the inverter designed to produce either ((28)) volts or ((115)) volts ((400)) Hz. a.c. depending on the secondary a.c. power requirements of an aircraft's electrical system.

Operation :

When the inverter is switched ((on)), d.c. is supplied to the motor Armature and shunt field winding and also to the excitation field winding of the generator. Thus the motor starts driving the generator which will produce a three-phase a.c. output at ((115)) volt. In order to control the voltage at this level, The d.c. supply is passed through a resistor in series with the generator field. This resistor is present to give the required excitation current at the regulated d.c. system voltage level. Since the frequency of the generator output is dependent on speed. Inverter produces ((115)) volt a.c., 400 Hz

Fuel Pump

Tank Isolating valve

The tank isolating valves, connected in the fuel lines between the wing tank and collector tanks are electrically remote controlled via two separate switches on the R. H overhead panel. Two valve test switches adjacent to the isolating valve control switches and enable a check to be made of the ((open)) position of the valve.

CONTINUITY TEST

Is a device for testing the continuity of an electric circuit or segment of circuit, the segment of a circuit to be tested is connected between the leads of the tester and if the circuit is complete the tester will respond.

The equipment normally used for continuity test, ohmmeters and test lamp

IV. CONCLUSION

Electrical Troubleshooting

Troubleshooting of an electric system follows the same general principle as the troubleshooting of other systems when a fault exists in a system it is necessary to determine the cause of the fault in the most effective manner and with the least expenditure of time and money, A thorough understanding of a system is essential if a fault in a system is to be eliminated quickly and effectively faults in electric systems may be caused by defective electric components such as switches, fuses circuit breakers, connectors wiring, terminals etc. In troubleshooting it is the purpose of the technician to isolate the particular component that is causing the trouble

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