

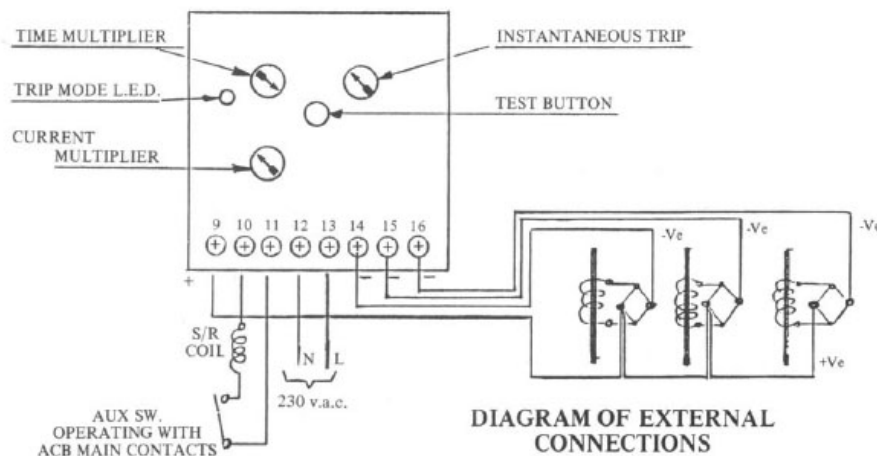


## GEA Air Circuit Breakers & CPR Relays

Many George Ellison Air Circuit Breakers were fitted with an electronic overcurrent protection relay known as a CPR relay. This relay was developed by and was unique to George Ellison Ltd. They provided rudimentary overload and short-circuit protection in conjunction with a set of unique sensing coils. The original data is shown below:



### C.P.R. RELAY OPERATING INSTRUCTIONS



#### TIME MULTIPLIER

Adjustable from 1 to 10 times the time shown on the characteristic for the over current range, to adjust rotate with a screwdriver until the arrow indicates the required multiplication factor.

#### INST. TRIP ADJUSTMENT

Adjustable from 5 to 15 times the CT. primary value i.e. 1000/5 CT's, arrow set to 9 relay will cause tripping at 9000A without time delay.

#### CURRENT MULTIPLIER

Adjustable from 0.8 to 1.0 x times the CT. primary setting i.e. with the current multiplier set at .8 and the CT. ratio 1000/5 the relay characteristic will operate on a full load current based on 800A not 1000A - this applies to the timed and instantaneous part of the characteristic.

#### TRIP MODE L.E.D.

This illuminates when the relay is in the operating mode i.e. when the load current exceeds the full load current value.

#### TEST

Depressing the test button simulates a fault of 6 x full load, it is necessary to keep this button depressed during the test.

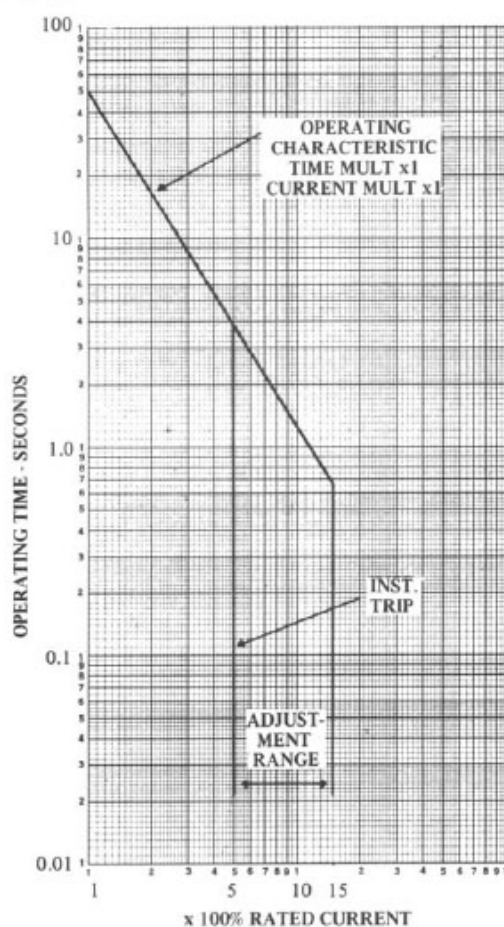


### TO TEST RELAY

- 1) Set inst. trip to 15 x.
- 2) Make sure 230V A.C. is connected correctly to terminals 12 & 13.
- 3) Set current multiplier at 1.
- 4) Depress trip button and hold, relay will trip in time indicated on curve equivalent to 6 x full load current.
- 5) Adjust time multiplier to 10 x repeat 4) trip time will increase to 10 x that obtained previously.
- 6) Adjust INST. TRIP to 5 x leaving time multiplier at 10 x, depress and hold the test button - trip will occur instantaneously.
- 7) Adjust to give required character.

Precise calibration can be checked using normal primary injection on the CT's.

### OPERATING CHARACTERISTIC



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Unfortunately, these relays turned out to be problematic with numerous problems including the following:

- Unable to injection test as the external sensing coils included integral electronics to provide a voltage input to the CPR so secondary injection testing is not possible.
- Thermal problems leading to failures.
- Lack of internal self-test so a failure was not known until the ACB fails to trip.
- Small batch manufacturing leading to inconsistent quality and a high failure rate.
- Spurious thyristor activation leading to unexplained ACB trip.
- Failure of sensing coil electronics – spares and replacements not available.

The above have resulted in CPR relays being unreliable and in our opinion they should be replaced – even if the test pushbutton is working. We service a large number of Ellison switchboards and the CPR relays are more often found to be non-functioning than serviceable.

The options for replacement are as follows:

## 1. Replacement of protection relay.

This option involves utilising a proprietary relay from a recognised manufacturer and fitting this to the ACB front-plate or within the switchboard. In addition to the relay a set of special CTs will be required to replace the CPR sensing coils to provide a 5A protection CT secondary. The ACB wiring loom will require modification. Most relays will also require an independent power supply. This often requires an upgrade of the 30V tripping battery to facilitate a standing-load facility that the relays will require. CPR relays did not require an external supply for power or tripping so a suitable supply will be required.

A new protection relay, CTs, auxiliary supply, and installation can add up to an expensive solution - and you are still left with an aged ACB.

## 2. ACB Retrofit

We have a standard range of ACB retrofits for the complete range of Ellison ACBs. This proven system replaces the complete ACB – both fixed and moving portions and is bolted directly to the existing busbar system. Any controls are automatically replicated and the new ACB will of course include a new integral protection relay. This solution leaves you with a complete new fully serviceable ACB and protection relay that will give many years service with a full range of standard spares and testing available. This option also allows for additional functionality of modern ACBs to be incorporated as well as new metering and control options if required.

As all Ellison GEA or ABDO Air Circuit Breakers in service today have exceeded their designed life we would have to recommend their replacement. ACB retrofitting enables this without disturbing cabling leaving you with a fully functional switchboard that will give many more years of service.