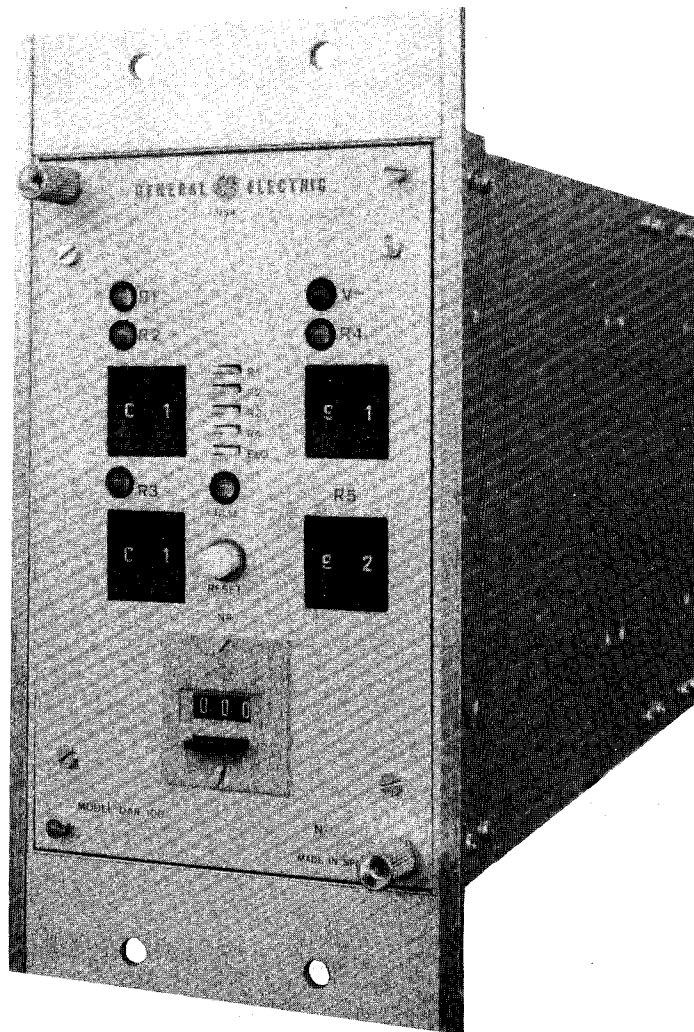




MODULAR MULTI-SHOT RECLOSING RELAYS

TYPE DAR 100



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DESCRIPTION

The modular DAR static reclosing relays described in these instructions provide one instantaneous and three time-delayed reclosures of power circuit breakers. The time-delayed reclosing attempts are independently adjustable. In addition, a reset timer provides the reclosing lockout function should a fault remain on the system following multiple clearing attempts. The reset timer is adjustable and is started by a reclose initiate signal or manual breaker closing signal.

The reclosing cycle is enabled by the combination of a protective relay output and circuit breaker opening.

After an initial reclosure takes place, any subsequent relay trip and breaker opening which occurs before the reset time elapses is interpreted to mean a persistent fault is on the power system. The DAR reclosing relay will continue its programmed sequence of time-delayed reclosures until the final reclosing attempt is made, assuming the fault was permanent. A protective relay operation and breaker opening occurring after the final reclosing attempt, and before the reset timer has timed out, will place the DAR in a "locked out" condition. Depending on the DAR model applied, the reclosing relay will return to the reset state either after a manual reset command, or after the reset timer times out.

A manual closing operation of the circuit breaker onto a fault will lead to the DAR reclosing relay "locking out" before any reclosing attempts are made.

The DAR reclosing relay provides an inhibit signal to instantaneous over-current functions in the associated protective relays. This signal blocks the instantaneous devices from tripping the circuit breaker during all reclosing attempts. When the DAR relay locks out, a telephone type relay closes its contacts to provide the lockout alarm function.

The DAR relays operate from a DC source and are protected against polarity reversals should the connections be accidentally crossed.

Table I illustrates the different DAR relay models, together with their distinguishing characteristics.

These instructions do not purport to cover all details and variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the GENERAL ELECTRIC (USA) PROTECTION AND CONTROL EQUIPMENT, S.A.

TABLE I
LIST OF MODELS

MODEL	THIRD DELAYED RECLOSE TIME	RESET TYPE	AUXILIARY VOLTAGE
DAR100A000B10	1 to 99 seconds	Automatic (*)	48 VDC
DAR100B000B10	10 to 990 seconds	Automatic	48 VDC
DAR100C000B10	1 to 99 seconds	Manual	48 VDC
DAR100D000B10	10 to 990 seconds	Manual	48 VDC
DAR100A000C10	1 to 99 seconds	Automatic	110/125 VDC
DAR100B000C10	10 to 990 seconds	Automatic	110/125 VDC
DAR100D000C10	1 to 99 seconds	Manual	110/125 VDC
DAR100D000C10	10 to 990 seconds	Manual	110/125 VDC

(*) Automatically resets after reset timer times out.

APPLICATION

A large percentage of faults in overhead distribution circuits are temporary in nature, and are self-clearing if the fault current is momentarily interrupted. Because of this fault characteristic, and in order to maximize service continuity and network reliability, some form of automatic reclosing scheme is generally applied in conjunction with protective relaying.

Most temporary faults will be self-clearing if the fault current is removed for less than ten seconds. However, a rather high percentage (ten percent) of faults will self-clear only after a 10 to 50 second interruption. Lastly, a very small number of faults will not self-clear until an interruption of 50 seconds or more occurs.

The purpose of applying an automatic reclosing scheme is to minimize out-of-service conditions and, consistent with good application practice, to minimize possible damage due to a fault. Out-of-service conditions are minimized by applying the highest possible number of reclosures that good operating practice will allow. However, the damaging effects of a system fault are minimized through high speed relaying and breaker interruption. Hence, the application of protective relays and reclosing schemes will mean a number of trade-offs will occur, and these trade-offs must take into account the protected line and associated equipment characteristics, together with the users' experience in the type of faults that occur.

A typical solution to this application problem involves an initial reclose time of less than ten seconds, followed by one or two slower reclose attempts, and finally a third delayed reclosure of up to 990 seconds.

INSTANTANEOUS RECLOSURE

One attempt at high speed reclosing can be applied which initiates a breaker closing signal immediately after the breaker opens with no intentional time delay.

Experience indicates fault clearing times are a factor in the probability of a fault to self-clear. The faster the tripping speed, the less system damage will occur. Also, the ionized fault arc will be minimized and easier to remove. For this reason, the application of the instantaneous reclose attempt is best suited to application of high speed relaying and breakers. In cases where tripping times are relatively slow, high speed reclosing is less likely to be successful.

Application of a DAR reclosing relay is flexible with respect to instantaneous reclosing. For example, if the protective relays only provide relatively slow tripping, then the DAR instantaneous reclose function can be disabled by a switch setting. If the protective relays can provide either high or slow speed tripping, depending on fault current magnitude, then an additional inhibit function can be connected to the relaying scheme, which will inhibit the instantaneous reclosing when time-delayed tripping occurs. If tripping is high speed, then no inhibit signal will be present, and the DAR will provide an instantaneous reclosure.

INSTANTANEOUS TRIP INHIBIT

The DAR relays provide an output contact to inhibit the instantaneous trip function of the associated protective relays after the first reclose attempt. This feature provides tripping coordination between the protective relays and fuse-protected radial taps in the distribution system. Coordination is achieved by initially protecting the fuses through high speed breaker tripping. Following the first reclose attempt, the instantaneous trip element of the protective relays is blocked, which then allows the fuse to blow for a permanent fault on a radial tap. This results in minimum service interruption, whether the fault is temporary or permanent.

MANUAL CIRCUIT BREAKER CLOSING

On receipt of a manual close command to the circuit breaker, the DAR relay will inhibit the instantaneous tripping functions of the protective relays and initiate the reset time timer. Should the protective relays trip and the breaker open prior to the reset timer timing out, then the DAR relay will go to the lockout state.

This operating philosophy is based on the premise that a fault, which is detected during reset time following a manual circuit breaker closing, was in fact present on the line prior to closing the breaker. For this reason, the closing command should take the reclosing relay to a state equivalent to that following a last reclose attempt onto a permanent fault.

PRACTICAL APPLICATION CONSIDERATIONS

When applying automatic reclosing, consider the following:

1. Latch checking switches: In order to ensure successful operation of a breaker reclosed by a type DAR relay set for immediate initial reclosure, it is necessary that the breaker mechanism be equipped with a latch checking switch, if the mechanism is trip-free. This switch ensures that the mechanism latch is properly set for reclosure before the opening circuit is completed. Latch checking switches are not required for non-trip-free mechanisms.

2. Undervoltage Devices: Where undervoltage devices are involved on the circuit fed by the breaker, it is usually necessary to coordinate the reclosing time and the trip time of the undervoltage device to ensure that the desired results are obtained. Where the undervoltage device is involved in a throwover scheme, the initial reclosure usually should be faster. Where motor control is involved, it may or may not be desirable for the initial reclosure to be faster. Each application should be checked to determine the required coordination.
3. Associated Protective Relays: When high speed reclosing is employed, the circuit breaker closing time should be compared with the dropout time of the protective relays that initiate the tripout. If high speed reclosing is to be successful, the protective relays that tripped the breaker obviously must reopen their contact before the breaker recloses. Otherwise, the breaker will be tripped again even if the fault has been cleared.
4. Breaker interrupting rating: The derating factor applying to the interrupting rating of the power circuit breaker should be checked prior to the application of a reclosing relay, or the selection of a reclosing cycle.

TECHNICAL SPECIFICATIONS

TIME SETTINGS

Instantaneous reclose:	No intentional delay
First delayed reclose:	0.1 to 99 seconds
Second delayed reclose (short):	1 to 99 seconds
Third delayed reclose (long):	10 to 990 seconds
Reset time delay:	1 to 99 seconds
Closing contact dwell time:	0.5 seconds

DC POWER SUPPLY

<u>Rated Voltage V_R</u>	<u>Range</u>
48 VDC	0.8 to 1.25 x V_R
110 VDC	0.8 to 1.25 x V_R

DC BURDEN

Reset State:	45 milliamperes
Maximum during reclosing cycle:	150 milliamperes

CONTACT RATINGS

Making ratings:	3000 watts resistive for 0.2 seconds, with maximum of 30 amperes or 300 volts DC
Interrupting rating:	50 watts resistive with maximum of two amperes or 300 volts DC

Continuous rating: Five amperes with 300 volts DC maximum

ACCURACY

Reclose timer: Plus or minus 5 percent, or 15 milliseconds, whichever is longer.

Reset timer: Plus or minus 10 percent, or 150 milliseconds, whichever is longer.

TEMPERATURE RANGES

Effective range: Minus 5°C to plus 40°C

Operating range: Minus 20°C to plus 55°C

Storage Range: Minus 40°C to plus 60°C

AMBIENT HUMIDITY

Up to 95 percent, provided that no condensation occurs.

INSULATION TESTS

Between each terminal and frame: 2 kV for one minute at system frequency

Between independent circuits: 2 kV for one minute at system frequency

Between terminals in each output circuit: 1 kV for one minute at system frequency

TYPE TESTS

IMPULSE TEST

5 kV peak, 1.2/50 microseconds, per IEC 255-5.

HIGH FREQUENCY DISTURBANCE TEST

1 MHz, 2.5 kV peak longitudinal mode, 1 kV peak transverse mode, decay time of three to six cycles to half value, rate of repetition, 400/second.

OPERATING PRINCIPLES

The DAR relay block diagram is illustrated in Figure 1.

INPUTS

The relay inputs consist of contact converter circuits which:

1. Convert the input signal voltage level to internal relay voltage levels.
2. Isolate external voltage from internal relay logic voltages.

RECLOSING SEQUENCE

In order to illustrate the DAR relay operation, the signal paths in the block diagram will be described for the reclosing sequence.

Initially, the relay is assumed to be in the reset condition and programmed for one instantaneous and one time-delayed (third delayed step) reclose attempts. LED R1 will be lit, as the DAR relay is in state 1, corresponding to the instantaneous reclosing.

1. The reclose output contact dwell time timer TS is reset to zero through gates AND 1 and OR 1.
2. The timer TI is started. This timer sustains the reclose initiate signal for 50 msec. after this signal disappears at DAR input.

If the breaker 52/b contact closes, indicating that the circuit breaker is open, before the 50 msec. of timer TI elapses, an initiating signal is generated. This initiating signal resets the reset timer and through the gate AND5 the following occurs:

1. The timer TS will be started by the OR2 gate output. This timer will provide the closing of the reclosing contacts for 500 msec.
2. The bistable FF2 is activated through gates OR2 and OR3. This bistable FF2 shall close the output contacts for the inhibition of instantaneous overcurrent functions.
3. The reset timer is started through gates OR2 and OR4.
4. The sequence timer is set up through OR2 and OR5 for the next programmed reclosing attempt. This change in state results in LED R4 being lit and LED R1 turning off.
5. The bistable FF1 is reset through OR2 and OR6 gates.

If the breaker closes, and remains closed for the reset timer time (meaning a successful reclose has occurred) an output at the reset timer is generated and the following occurs:

1. The bistable FF2 is reset through OR7 gate.
2. The reclosing sequence logic is reset to state 1 through OR8 gate.

Should the breaker close and trip open again before the reset time elapses indicating that the fault did not clear successfully while the breaker was open, then the reclosing relay logic advances to state 4 (assuming the single digit delayed reclose is set on the third delayed step), and the following occurs:

1. The reclosing sequence timer begins counting the time which corresponds to the third timed reclose setting.
2. LED R4 begins pulsing to indicate the timer is operating.

When the timer times out, a signal is produced in the output bus which:

1. Resets the initiating signal input.
2. Picks up the closing contact for a dwell time of 500 milliseconds.
3. Initiates the reset timer.
4. Signals the recloser logic to advance to the next logic state. This change in state results in LED BLQ pulsing and LED R4 turning off. The pulsing of LED BLQ indicates the reset timer is in operation.

Should this final reclose attempt be successful, as indicated by the breaker remaining closed longer than the reset time setting, then the DAR will proceed to its reset state. However, if the final reclose attempt is unsuccessful, and the breaker is tripped open again before the reset time elapses, then a lockout condition occurs which:

1. Closes the lockout-alarm contacts.
2. Lights LED BLQ continuously.
3. The reclosing sequence timer is reset to state 1.
4. Resets the output which previously blocked instantaneous trip by protective relays.
5. Inhibits and reset any further reclose initiating signal through NOT1 and AND3.
6. Prevents any LED being lit except LED BLQ.

From this locked out condition, the DAR reclosing relay can be reset either manually or automatically after the reset time delay, depending on the model selected.

MANUAL CIRCUIT BREAKER CLOSING

The energizing of the manual closing input produces a signal which:

1. Produces an instantaneous trip inhibit output to block instantaneous trip relays and activates FF2 through OR3.
2. Initiates the reset timer through OR4 and activates FF3.
3. LED BLQ begins pulsing.

Should the protective relays trip the circuit breaker before the reset timer times out, then the DAR advances to the locked out state.

INSTANTANEOUS RECLOSE INHIBIT

The instantaneous reclose setting can be inhibited and bypassed to the following programmed reclosing step by the presence of a signal at the instantaneous reclose inhibit input.

POWER SUPPLY

The DC to DC power supply provides regulated plus 12.6 volts DC and plus 5.1 volts DC as required by the static circuit. A green LED on the front panel of the relay is lit when the power supply is functional.

CONSTRUCTIONGENERAL

Type DAR modular reclosing relays occupy one quarter of a 19 inch rack-mounted case; hence, DAR relays can be combined with other protective relays in a complete rack-mounted system. The internal connection diagram for Type DAR relays is shown in Figure 2.

STRUCTURE

The basic module structure is formed by an extruded aluminum back that supports four rails. User settings are located on the front cover plate of the relay.

SUBASSEMBLY ARRANGEMENTS

The subassemblies within the DAR relay are located in three "zones", depending on the functions.

Input and output elements are located in the rearmost zone, which comprises the connector and output relays. The aluminum extrusion specifically designed for this purpose also accommodates the voltage regulator. The heat dissipation characteristics of this rearmost zone are further complemented by strategically located ventilation slots in the relay case.

Solid state electronic circuits are located in the central zone of the modular case, between the extruded back and the front plate. The circuitry is made up of printed circuit boards mounted parallel to the module center line, and supported by four guides, with their corresponding stops at the extrusion which forms the rails.

As viewed from above, and with the extruded aluminum part in the rear of the relay, the location of the electronic circuits from right to left are as follows:

First Card

Power Supply and input and output circuit connections.

Second Card

Reclosing sequence logic, remote reset logic and instantaneous reclose inhibit logic.

Third Card

Timers for the reclosing sequences, reset time, closing contact dwell time, in addition to the oscillator and manual-closing logic.

RELAY SETTINGS

All of the switches used for setting the DAR relay are mounted on the printed circuit boards. Cut-outs on the relay front cover plate provide convenient access to these setting switches.

LED DIODES

V: This green LED indicates the power supply is functioning normally. It is located on the third card described above.

R1

This red LED indicates the instantaneous reclose output is enabled, and the DAR relay is ready to perform this operation. It is located on the first card described above.

R2, R3, R4

These red LEDs correspond to the operation of the three delayed reclosures which can be set on the DAR relay. When lit, the LED(s) indicates that the corresponding reclose step is enabled and ready to function during a reclosing sequence. When pulsing, the LED indicates that the corresponding reclose step timer is timing, and after the set time delay, a reclosing output will appear.

LEDs R2 and R3 are located on the first printed circuit card, and R4 is located on the third printed circuit card described above.

BLQ

This red LED has three possible states: off, pulsing and on. When it is pulsing, the reset timer is timing out. When fully on, the LED indicates the DAR relay is blocked from further reclosing attempts following unsuccessful clearing of a power system fault (that is, the protective relays tripped before the expiration of the reset time).

Reclosing Program Switches

R1, R2, R3, R4 and BLQ enable or disable the possible steps in the reclosing scheme. BLQ is used to inhibit the operation of the reclosing relay. The various functions are enabled when the switch is positioned to the left. These switches are mounted on the second printed circuit card described above.

Timer Settings

R2, R3, R4 and R5 - Two-digit thumbwheel switches are used to set the reclose step times and reset time on the DAR relay.

Reset Button

This pushbutton switch is used to manually reset the DAR relay when the relay is blocked from operation following an unsuccessful reclosing sequence. It is also used after making setting modifications on the relay.

Operation Counter

A three digit mechanical counter is provided to record the number of reclosing signals sent to the circuit breaker. A manual reset button is included.

MECHANICAL DESIGN

Module Guides

The relay module is inserted into position within its rack or switchboard mounted case by means of rail type guides. The guides assure correct alignment of the plug at the rear of the relay module with the socket mounted in the rear of the case.

Module Keying

Since the DAR relay module is dimensionally similar to other relay modules of the same family, such as inverse time overcurrent and directional overcurrent relays, a mechanical keying scheme is employed to prevent inserting the relay into an incorrect case or slot in a multi-function case. The keying is accomplished by placement of stud-shaped elements in the rear of the relay module which align with holes in the rear of its associated case.

Slow-Insertion Elements

To prevent intermittent making and breaking of the socket pins of the relay module connector, two captive thumbscrews are used to engage or disengage the relay module from its case. The thumbscrews are located on the front cover plate of the relay. When inserting the relay module into its case, the threaded portion of the thumbscrews make contact with their associated captive nuts in the case prior to electrical contacts being made in the connecting plug/socket. Simultaneous turning of the thumbscrews then slowly inserts the relay module into its case, and seats the plug elements in the socket.

Should the module be inadvertently inserted into an incorrect case, the module keying elements prevent the thumbscrew threads from making contact with their associated nuts.

Cover

The transparent cover is a self-quenching, non-inflammable material, which provides a clear view of all the relay settings, while preventing accidental handling of the setting elements.

The cover is secured to the front of the relay by means of two thumbscrews, which engage a threaded portion of the "slow insertion" thumbscrews. The cover thumbscrews can be fixed by means of a sealing device.

Outline Drawing and Panel Drilling Dimensions

Figure 5 illustrates the outline drawing and panel drilling dimensions for the DAR relay in a component (one quarter size) case.

RECEIVING, HANDLING AND STORAGE

This relay is supplied to the customer in a special packing that properly protects it during transportation, provided transportation is done under normal conditions.

Immediately after receiving the relay, the customer must check it to see if there are any signs of damage during transportation. If it is evident that the relay has been damaged due to poor handling, the transportation company must be immediately notified in writing, informing the factory of this fact.

To unpack the relay it is necessary to take the normal precautions taking care of not losing the screws that are supplied inside the box.

If the relay is not going to be installed immediately, it is recommended to store it in its original packing in a dry and dust free location.

It is important to check that the inscription in the nameplate matches the data in the order.

ACCEPTANCE TESTS

It is recommended, once the relay is received, that a visual inspection and the tests indicated below be performed immediately to ascertain that the relay has not suffered any damage during transportation and that the factory calibration has not been altered. If the inspection or the tests performed show that it is necessary to make a readjustment of the relay, see the paragraph RELAY CALIBRATION.

These tests can be performed as installation or acceptance tests, depending on the criteria of the user. Since most users have different procedures for the installation and acceptance tests, this section indicates all the relay tests that can be performed.

VISUAL INSPECTION

Check that the model indicated in the front plate corresponds to the data indicated in the order.

Unpack the relay and check that there are no broken parts and no signs that the relay has suffered any damage during transportation.

ELECTRICAL TESTS

The following paragraph describes the test procedures for DAR relays supplied as component relays. The test connections used for this purpose is shown in Figure 3. If DAR relays are mounted with other relays (TOC, TCC, Test module) forming protection systems, the test connections shown in figure 3 can be

used taking into account that relay studs shown in this figure must be changed to those that represent the inputs and outputs of the DAR in the external connections of the protection system. Identification of these studs is as follows:

1. The module pins (see internal connections Fig. 2) are always the same independently of the relay being supplied as component unit or forming part of a protection system.
2. Identify the test connection studs as shown in Fig. 3 of this book.
3. With the relay internal connection diagram (see Fig. 2) identify the module pins directly connected to the external studs of point 2.
4. In the internal connection diagram of the protection system under consideration identify the same module pin (those found in point 3).
5. In the external connection diagram of the protection system under consideration identify the external studs directly connected to the module pins found in point 4.

DAR TESTS

Insert the DAR module into its case with the setting switches R1, R2, R3, R4 and BLQ positioned to the left.

Make the external test connections to the DAR relay according to the diagram in Figure 3.

Apply rated DC voltage with a ripple not higher than 10%. The green LED should light, indicating the power supply is functioning, and the red LED R1 should light, indicating the reclosing relay is ready to operate with an initial instantaneous reclose attempt.

Adjust the reset time setting, R5, for ten seconds. Set the reclose timers, R2, R3 and R4, for one second. Depress test switch S1. The reclosing contacts should close for 500 milliseconds and test lamp L1 should light, indicating the instantaneous trip inhibit contacts have closed. Red LED R1 will turn off, and red LED R2 will now be lit.

Before ten seconds elapse, depress S1 again, and observe LED R2 begins pulsing. The pulsing indicates the reclosing timer is operating, and after one second (as set on thumbwheel switch R2), the reclosing contact will close for a 500 millisecond dwell time. When the reclosing contact closes, LED R2 will turn off and LED R3 will turn on. Test lamp L1 will remain lit.

Before ten seconds elapse, repeat the S1 closing operation, which will result in R3 pulsing for one second, after which the reclosing contacts close for 500 milliseconds, LED R3 turning off, and LED R4 turns on. Test lamp L1 should remain lit.

Repeat this test again before ten seconds elapse, and observe similar result of LED R4 pulsing for one second, followed by closing contact operation for 500 milliseconds, LED R4 turning off, and LED BLQ pulsing. Test lamp L1 should remain lit.

If within ten seconds the test switch is depressed again, then the DAR relay will proceed to the lockout or "blocked" state. LED BLQ will be lit. Test lamp L1 will turn off, indicating the instantaneous trip inhibit contacts have opened. Test lamp L2 will light, indicating the blocking alarm contacts have closed.

The DAR100A and DAR100B relays will remain blocked until the reset timer has timed out. Other DAR relay models will remain blocked until manually reset. When the DAR relay resets, LED BLQ turns off, and test lamp L2 turns off.

If test switch S1 is not depressed within ten seconds following the last reclose attempt, then the DAR will reset automatically when the reset timer times out. LED R1 will light, and LED BLQ, together with test lamp L1, will turn off.

Remote Reset Test

Bring the relay to the blocking (locked out) state, depress switch S2, and the relay should reset.

Instantaneous Reclose Inhibit Test

With the DAR relay in the reset state, depress test switch S3. LED R1 should turn off, and LED R2 should turn on.

Manual Closing Test

Depress the relay reset button, depress test switch S4, and observe LED R1 turns off, test lamp L1 lights, and LED BLQ begins pulsing. If switch S1 is depressed within the following ten seconds, the relay will be blocked, L1 will turn off, L2 will light, and LED BLQ will be on continuously.

If test switch S1 is not depressed within this time, the relay will automatically reset.

Now place the relay in the blocking state and depress test switch S4. LED BLQ will change from continuously on to the pulsing state, and from this point the condition will be as in the previous case with the relay in the reset state.

Blocking Switch Test

With the BLQ switch positioned to the right (on), the green LED will be on, indicating the power supply is functioning. When S1 is depressed, nothing should occur, and the relay will remain in the reset state.

Timer Checks

1. Reclose Time (dead time)

Place relay setting switches R1, R2, R4 to the right, and R3 and BLQ to the left.

Adjust thumbwheel switch R3 to 20 seconds.

Depress the reset button.

Depress test switch S1. The time from closing of contact A3 until the instantaneous trip inhibit contacts close (C3, C4-D3, D4) should be 20 seconds, plus or minus five percent.

2. Reset Timer

Place relay setting switches R2, R3 and R4 to the right, and R1 and BLQ to the left.

Adjust thumbwheel switch R5 to 20 seconds.

Depress reset button.

Depress test switch S1. The time from closing of the instantaneous trip inhibit contacts (C3, C4-D3, D4) until these contacts open should be 20 seconds, plus or minus ten percent.

3. Closing Contact Dwell Timer

Place relay setting switches R1 and BLQ to the left, and all other setting switches to the right.

Depress test switch S1, and observe the time for the closing contacts to remain closed is 0.5 seconds, plus or minus ten percent.

INSTALLATION

INTRODUCTION

The place where the relay is installed must be clean, dry, free of dust and vibrations, and must be well lit to simplify inspection and tests.

The relay must be mounted on a vertical surface. Figure 5 represents the outline and drilling diagrams.

The internal and external connection diagrams are shown in Figures 2 and 6. If the inspection or tests performed show the need for adjustment, see paragraph RELAY CALIBRATION.

GROUND CONNECTION FOR SURGE SUPPRESSION

Tap D5 of the relay must be grounded so that the surge suppression circuits included with the relay operate correctly. This ground connection must be as short as possible to assure maximum protection (preferably 25 cm or less).

TIMER SETTINGS

R2, R3, R4 and R5. Two-digit thumbwheel switches are used to set the reclose step times and reset time on the DAR relay.

RELAY CALIBRATION

Connect the relay as shown in Figure 3.

Position setting switches R1, R2, R4 and BLQ to the right, and R3 to the left.

Adjust thumbwheel switch R3 to 15 seconds.

Depress the reset button.

Depress test switch S1. Observe the time from when contact A3 is closed until the instantaneous trip inhibit contacts close (C3, C4-D3, D4) is 15 seconds, plus or minus five percent.

To adjust the reclose timer (dead time), turn the calibration potentiometer (see figure 4) clockwise to increase the time, or counterclockwise to decrease it.

PERIODIC TESTS AND MAINTENANCE

In view of the fundamental role of the protection relays in the operation of any installation, it is recommended to follow a program of periodical tests. Since the interval between periodical tests varies for different types of relays, types of installations, as well as with the experience of the user on periodical tests, it is recommended that the points described under paragraph ACCEPTANCE TESTS be checked at intervals of 1 to 2 years.

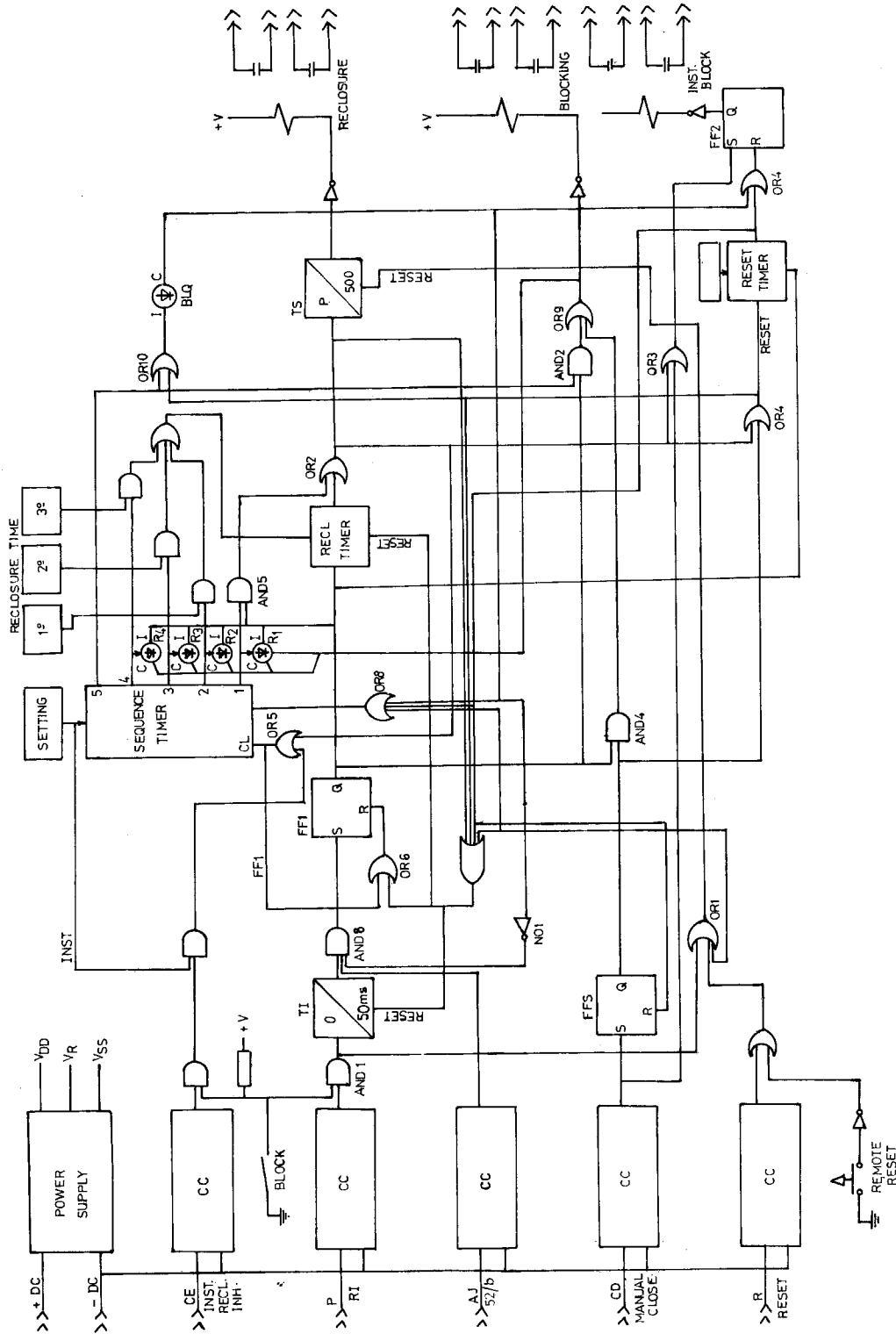


Fig. 1 Block diagram of DAR

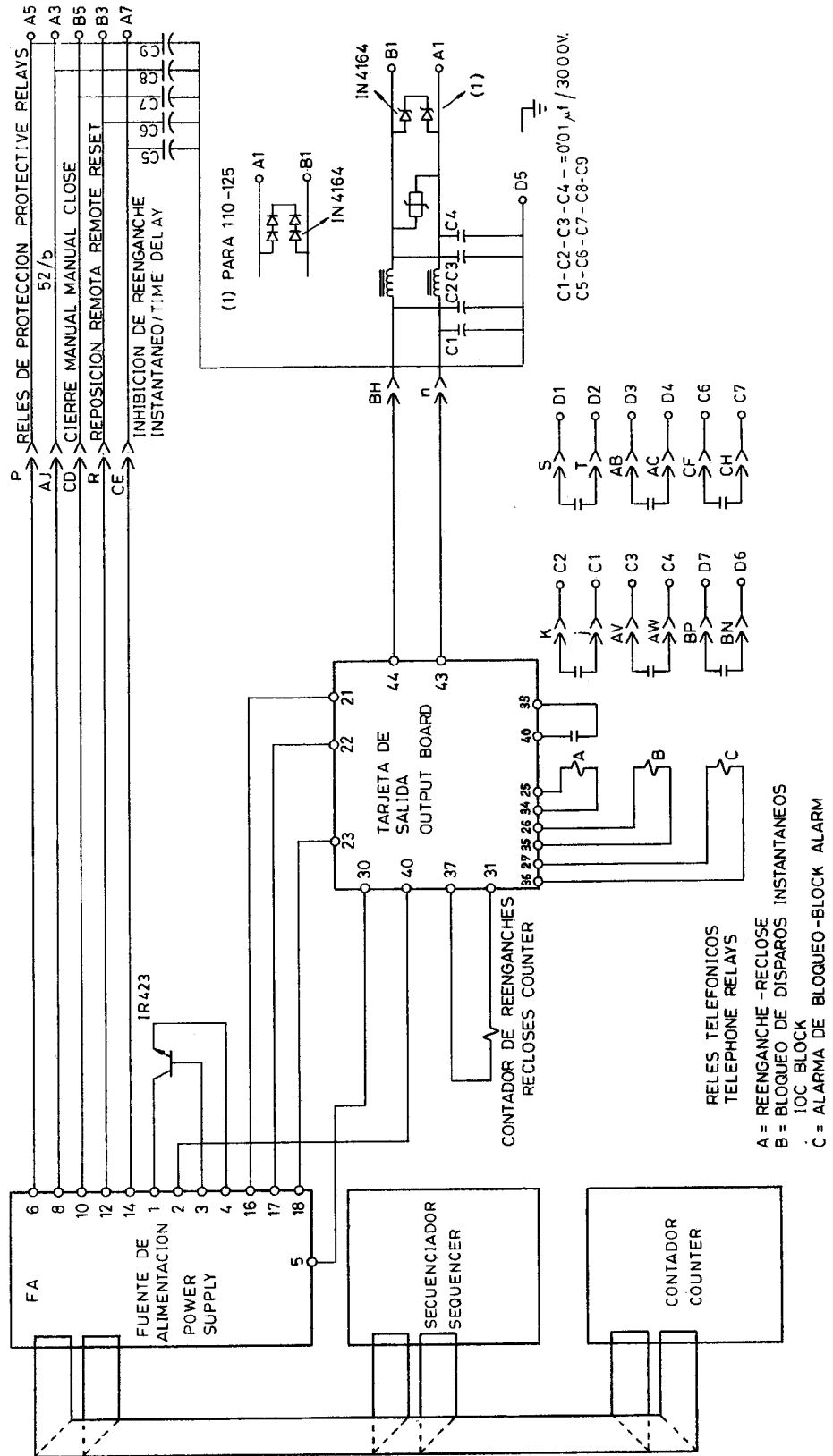


Fig. 2 Internal connections diagram

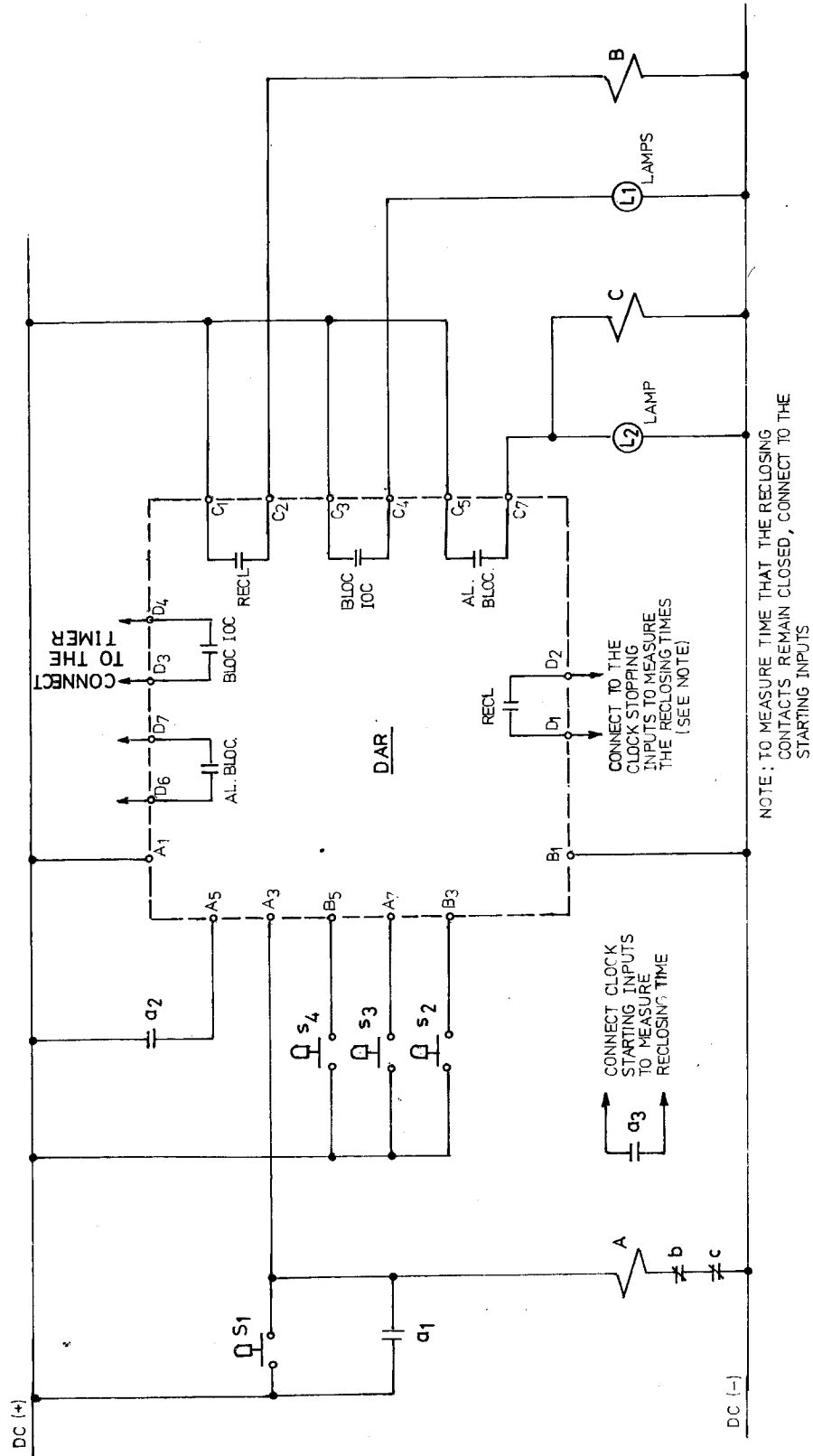


Fig. 3 Tests connections diagram

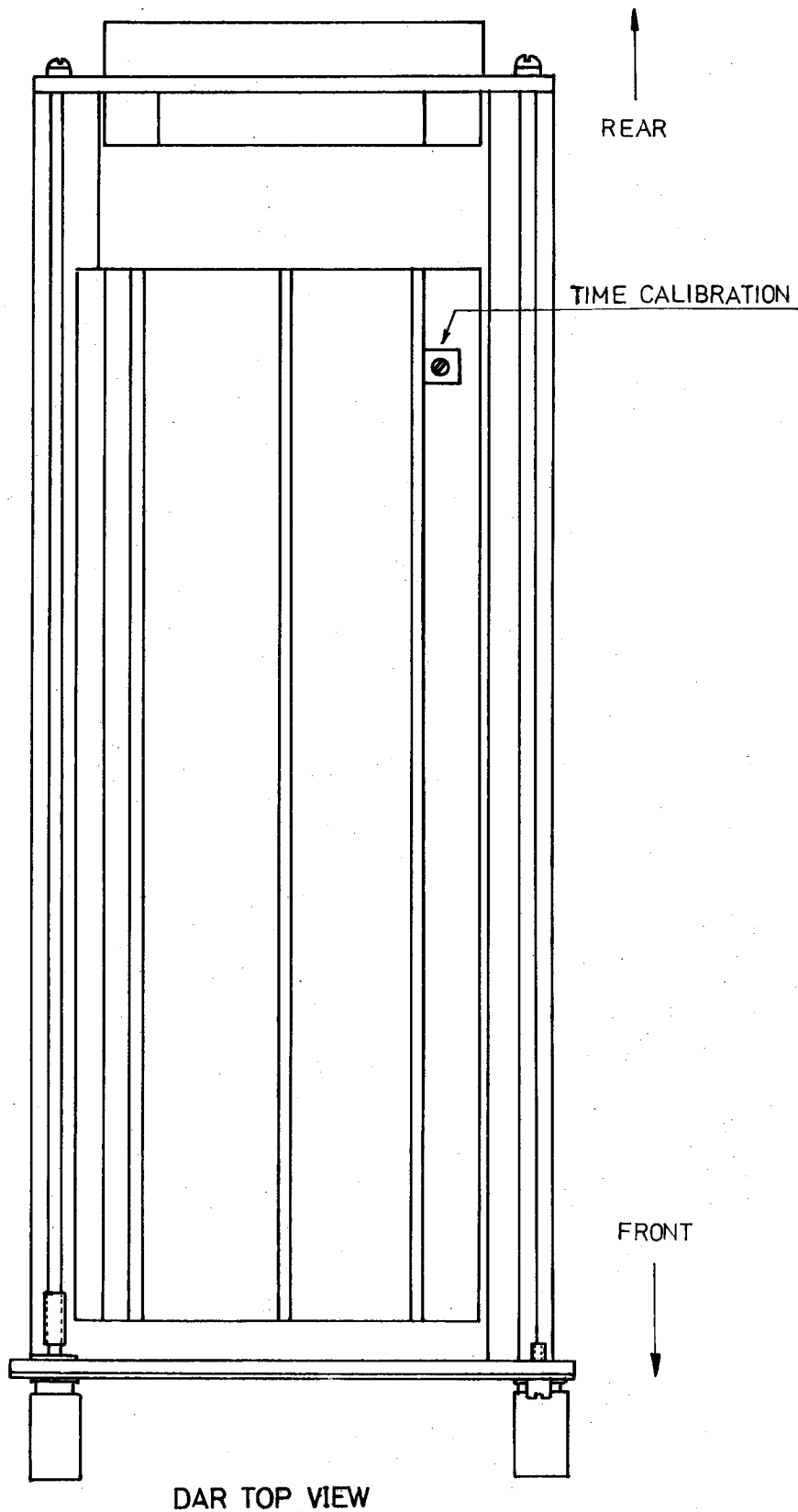
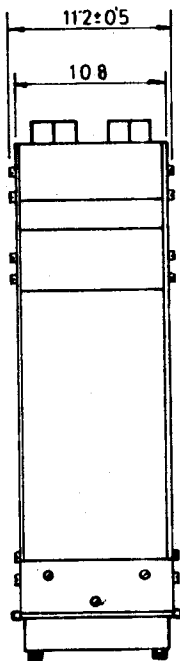
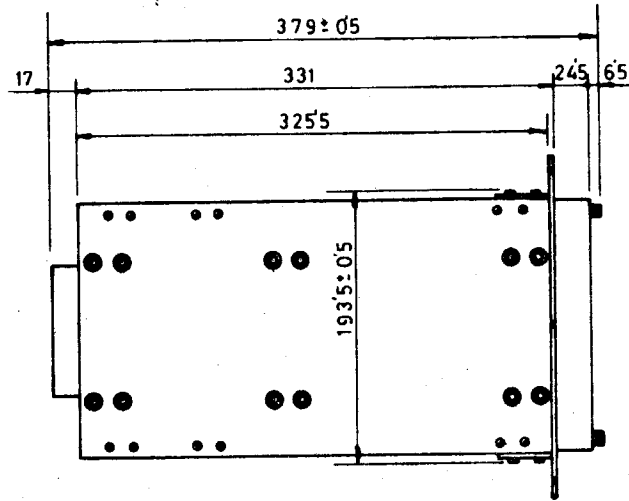
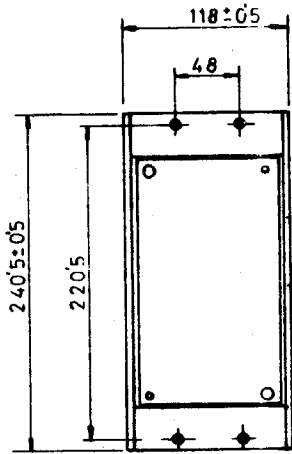
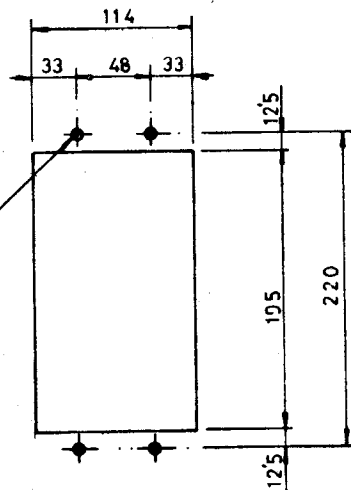


Fig. 4 Internal controls



4 AGUJS. DE 7^Ø PARA ANCLAJE
 4 HOLES OF 7^Ø FOR DRILLING



PERFORADO PARA MONTAJE
 DIMENSIONS FOR MOUNTING

Fig. 5 Outline and Panel drilling

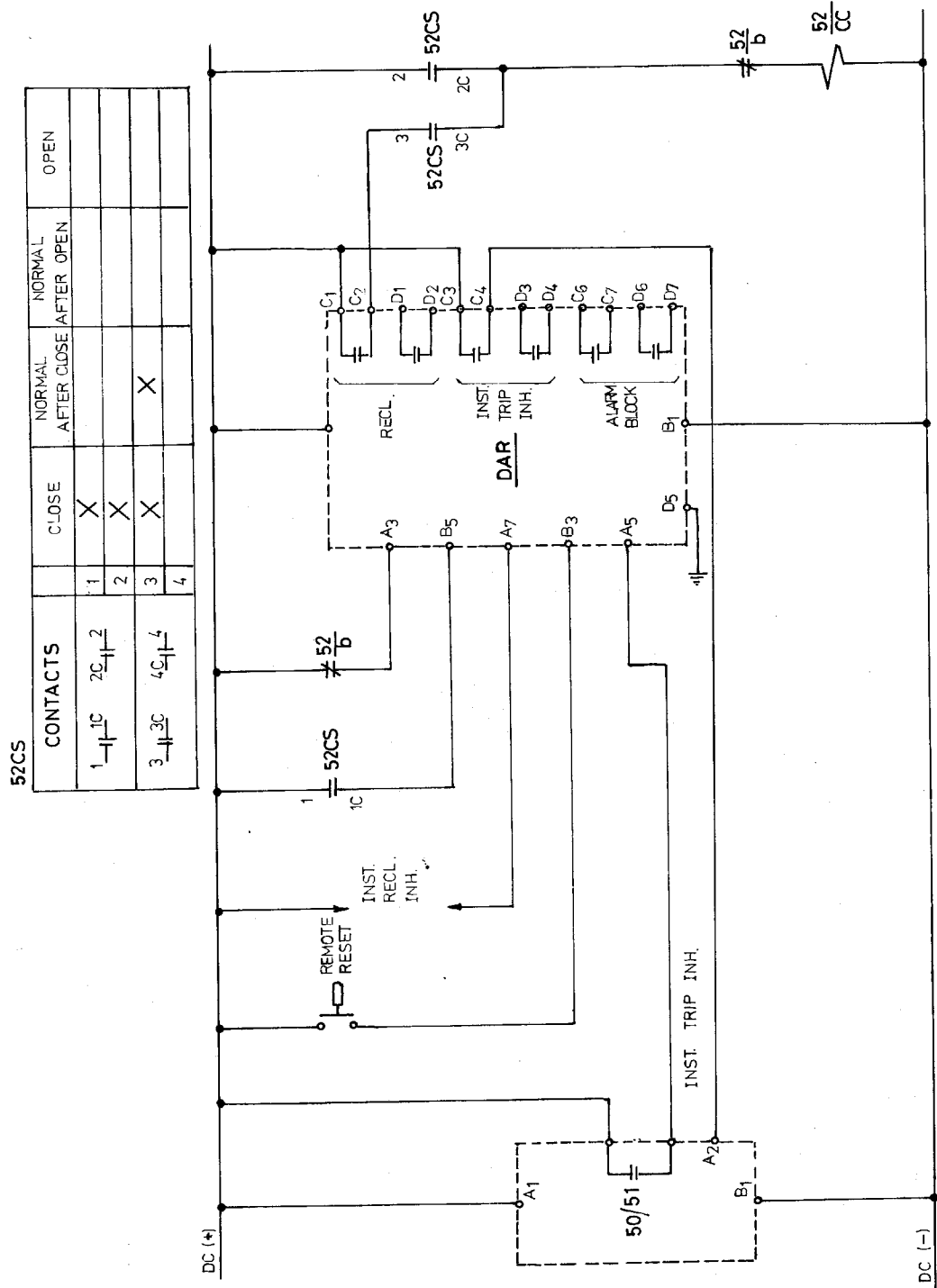


Fig. 6 External Connections diagram

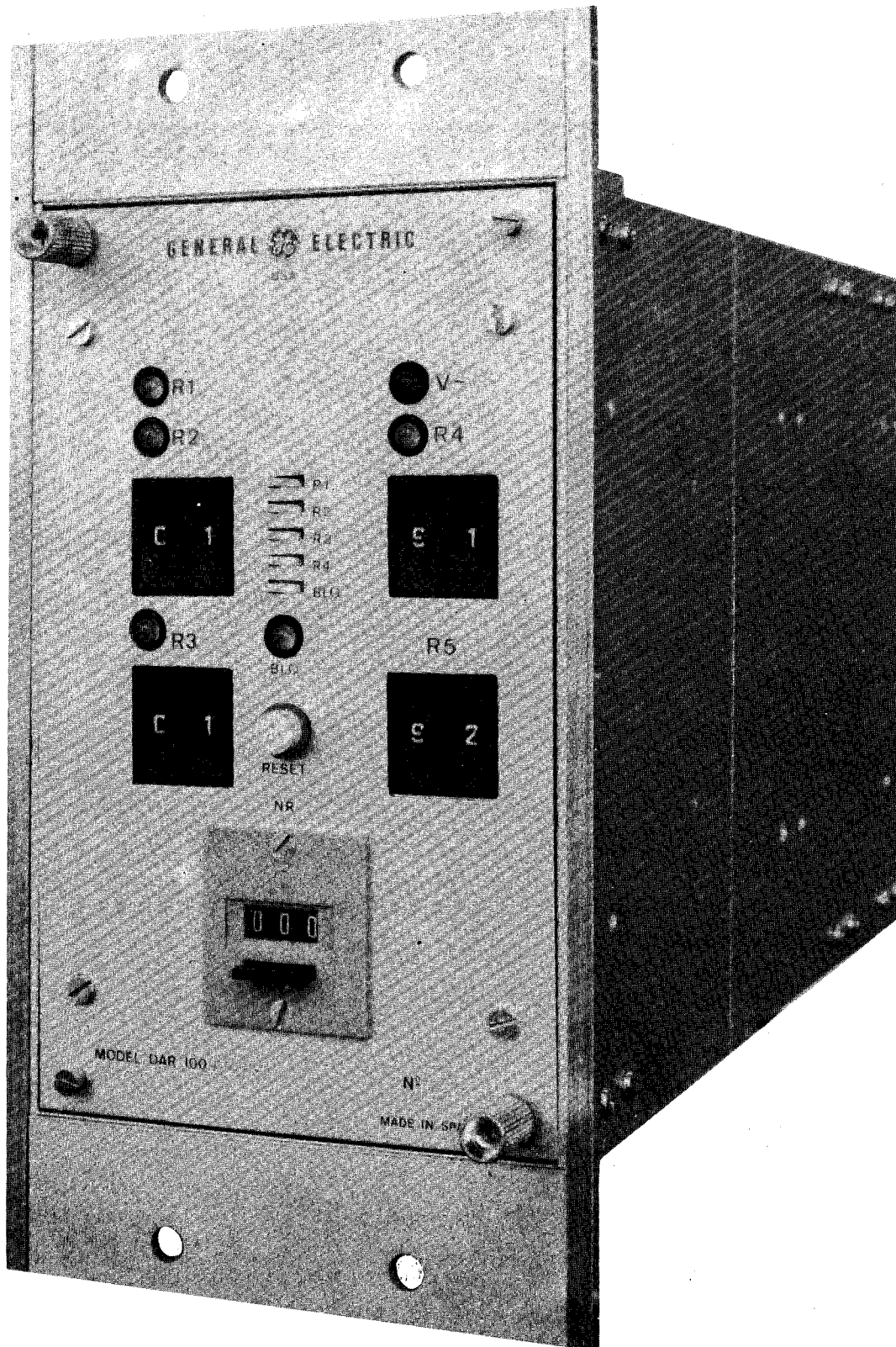


Fig. 7 DAR relay

**GENERAL ELECTRIC (U. S. A.)
PROTECTION AND CONTROL EQUIPMENT, S. A.
APARTADO 732, BILBAO - ESPAÑA**

