SECTION 6

28V D.C. POWER SUPPLIES

1. Introduction

28V D.C. power for the low power loads is supplies by two 7.5 KW Transformer Rectifier Units. The T.R.U.'s are fitted in the nosewheel bay together with their associated single 24V 40 AH type K2 battery (Alkaline type). A description of the system is given in the following paragraphs.

2. 7.5 KW Transformer Rectifier Units

There are two units, one set mounted in the port nosewheel bay and the other on the starboard side. 200V A.C. 3 phase current is supplied to the input terminals and through the STAR/DELTA formation transformer, stepped down to 28V and rectified. The output is delivered via a reverse current relay to the essential bus bar i.e. PORT T.R.U. feeds 15P
STBD T.R.U. feeds 16P

These two panels are then united at panel 19P. The T.R.U.'s are fan cooled, the fan motor supply being obtained from tappings on the primary supply.

3. Main Contactor

Each T.R.U. is supplied via an associated 3 phase contactor. The contactor is energised by selecting the appropriate control switch mounted on 50P (A.E.O.'s station) to 'ON'.

4. Reverse Current Relay

Each T.R.U. supplies current to the essential bus bar via an associated reverse current relay. These are polarised and reverse current units combined. Should a fault occur on the T.R.U. output side which would cause a heavy discharge current to flow from the bus bar to the T.R.U., then the polarity of the current flow through the reverse current coil becomes cumulative to the permanent magnet contacts. This will cause them to open thus breaking the supply to both main contactor and relay coils. The faulty T.R.U. will be isolated.

5. Magnetic Indicator

Indicates on the system "MIMIC" panel (50P) T.R.U. 'ON' and 'OFF' line.

6. Circuit Operation

Selecting the control switch to 'ON' will simultaneously energise the main contactor and reverse current relay and the T.R.U. will deliver current to the essential bus bar. The "mimic" indicator will operate with the closing of the main contactor to show the T.R.U. 'on line'.

Selecting the second control switch to 'ON' will result in the other T.R.U. coming on line and paralleling itself into the essential bus bar.

NOTE. The T.R.U. control switches are fed from the vital and essential bus bars via silicon diodes.

7. Circuit Faults

(a) Out of Balance Input

Should a breakdown of the T.R.U. primary windings result in one or more input fuses blowing (Actually all fuses would probably blow) then the T.R.U. is isolated from further damage. The sound T.R.U.

/ cannot

cannot deliver current into the faulty one so it follows that no damage will result from this source. It should be noted that in this case, the faulty T.R.U. will still indicate 'ON LINE'.

(b) T.R.U. Output to earth

Should a fault develop between the T.R.U. output and reverse current relay to earth, then the current flow from either the other T.R.U. or Battery will flow in the reverse direction through the reverse current relay coil thus causing the contacts to open. On opening the output relay and main contactor will de-energise thus isolating the fault. The indicator will show off line.

(c) Resetting

To reset the reverse current relay the T.R.U. control switch is placed to the reset position which will cause the reset coil of the reverse current relay to energise and close the permanent magnet contacts. The switch is spring loaded from the reset position.

8. 28V D.C. Bus Bar System

The aircraft 28V D.C. bus bars are divided into four separate units.

(a) Battery Bus Bar to which the battery is permanently connected and feeds the A.A.P.P. starter motor.

(b) Vital Bus Bar which is permanently connected to the battery bus bar via a rectifier, and caters for crash and emergency services. The bus bar is also connected from the essential bus bar via a second rectifier.

(c) Essential Bus Bar connected to the battery bus bar via the battery isolation contactor and feeds all loads essential to maintain control of the aircraft.

(d) Non Essential Bus Bars connected to the essential bus bar via two latched contactors, and feed all loads not essential to aircraft control.

9. Battery Isolation Contactor

This is a heavy duty latch type contactor. Its purpose is to connect the battery bus bar to the essential bus bar. Tripping of this contactor is effected by either selecting "OFF" on the isolation switch fitted to 50P or operation of the crash switch.

10. Load Shedding Contactors

These are similar in type to the isolation contactor and their purpose is to connect the essential bus bar to the non essential bus bars.

11. Ground Servicing Contactor

This contactor enables an external 28V supply from a ground truck to be connected to the essential bus bar.

12. Battery Isolation

(a) Switching on

Operation of the spring loaded battery isolation switch (50P) to 'ON' will feed 28V D.C. from the vital bus bar to energise the close coil of the battery isolation contactor, which on closing connects the battery bus bar to the essential and non essential bus bars. At the

/ same time

same time the indicator will energise to show that the contactor is closed.

(b) Switching off

Operation of the switch to 'OFF' will feed the 28V D.C. to energise the trip coil of the battery isolation contactor thus opening the contactor, disconnecting the battery bus bar supply and de-energising the indicator.

(c) Switching off During Crash

During crash when inertia switches 1 and 6 operate relay 86 is energised. This relay feeds 28V D.C. to the trip coil of the contactor with results similar to 12(b) above.

13. (a) Isolating Non Essential Bus Bar

Should a complete alternator failure occur, then it becomes necessary to employ the ram air turbine, until the A.A.P.P. is ready to assume the aircraft loads. Since the R.A.T. is not capable of sustaining all aircraft loads then all non essential circuits must be shed. The ram air turbine platform in lowering will operate two micro switches associated with the battery isolation circuit. These will operate to trip both load shedding contactors via, the closed contacts of relays 566 and 567. Simultaneously relays 566 and 567 will energise via a delay circuit. The delay is to ensure that the load shedding contactors trip. Tripping of the contactors disconnects the supply from the Non essential bus bars. The load shedding magnetic indicators (5QP) which are energised from the non essential bus bars are now de-energised to show an 'OFF' presentation.

The Non essential load shedding contactors may also be tripped by operation of the Non essential reset switch (1QP) to the trip position, with results similar to above except relays 566 and 567 do not energise.

(b) Reset

If after tripping, conditions occur whereby the non essential loads can be reconnected this can be done by operation of the non essential reset switch to the reset position. 28V will be fed to the close coil of the load shedding contactors. The contactors upon closing will connect the supply to the non essential bus bars again. The magnetic indicators will now be re-energised but through the contacts of relays 566 and 567 which are energised and so the indicator will give an "ON-OVERRIDE" indication.

If the reset had been done after tripping by the trip switch the system would reset as above but the indicator would show "ON" as relays 566 and 567 are not energised.

14. Ground Supplies

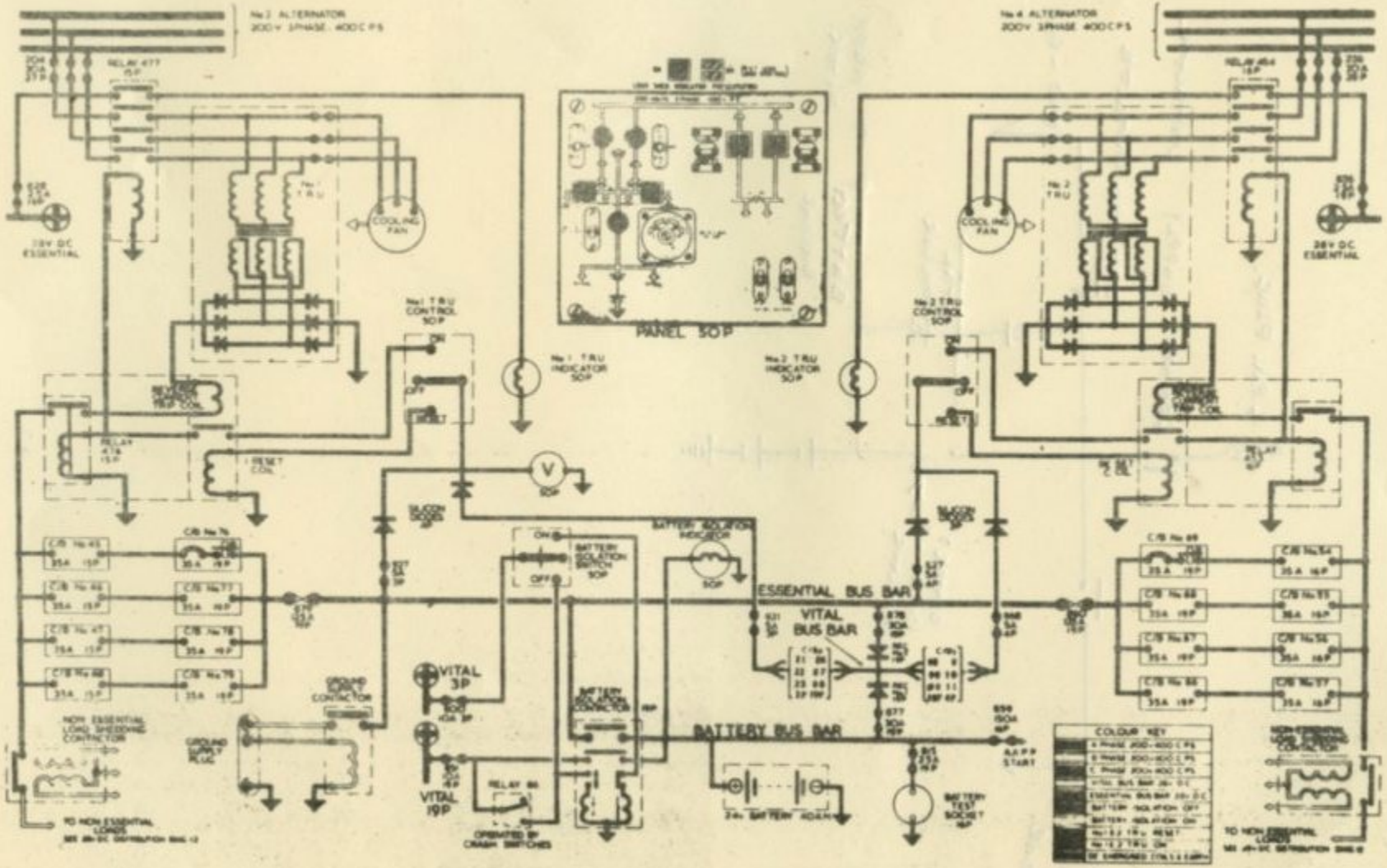
To enable a 28V ground supply to be used a three pin N.A.F.O. plug is provided. When the supply is pluged in and switched on, the small third pin feeds 28V to energise the ground supply contactor which in closing connects the 28V ground supply to the essential bus bar.

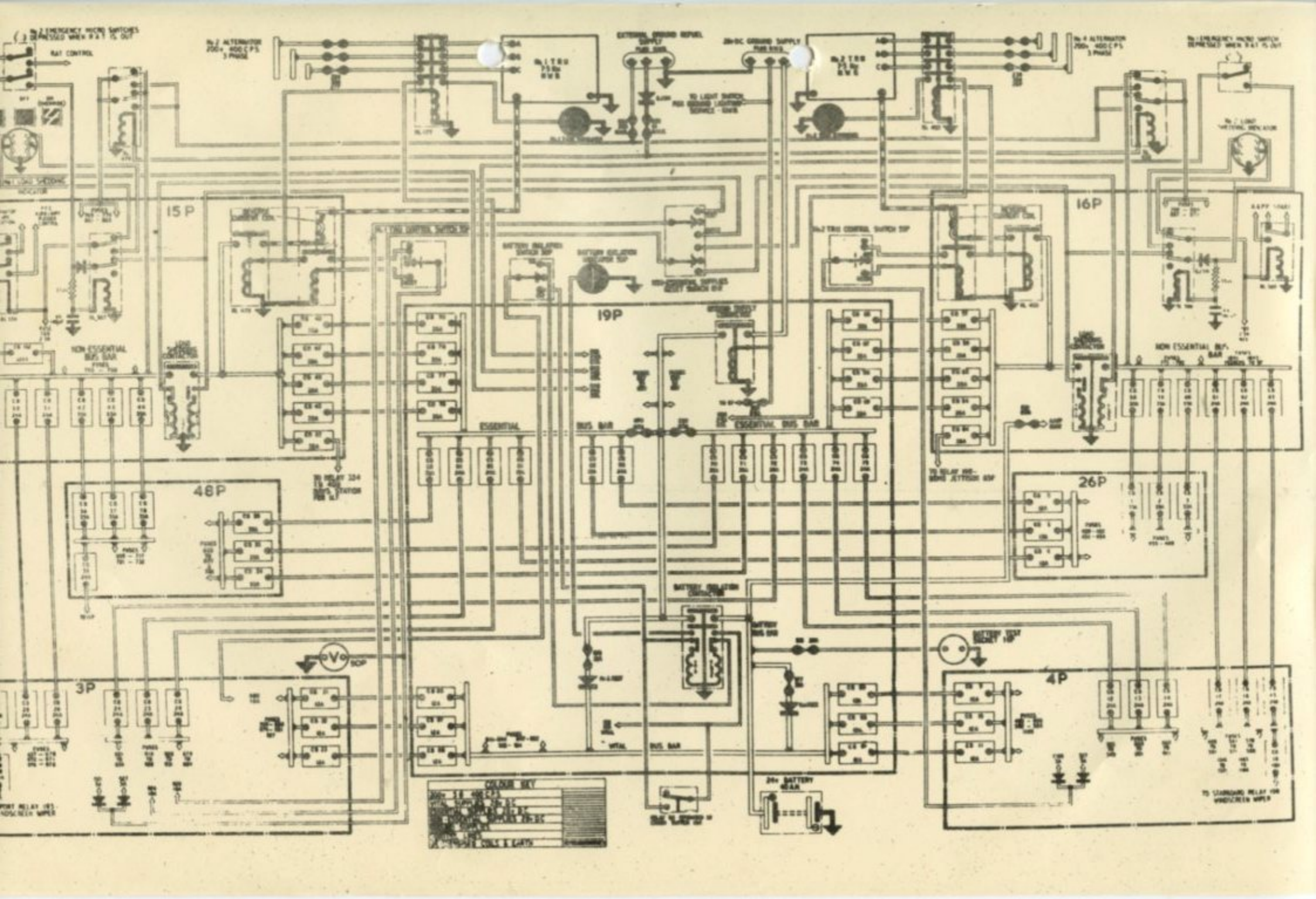
The third pin also feeds the ground servicing lights via a switch in the nosewheel bay.

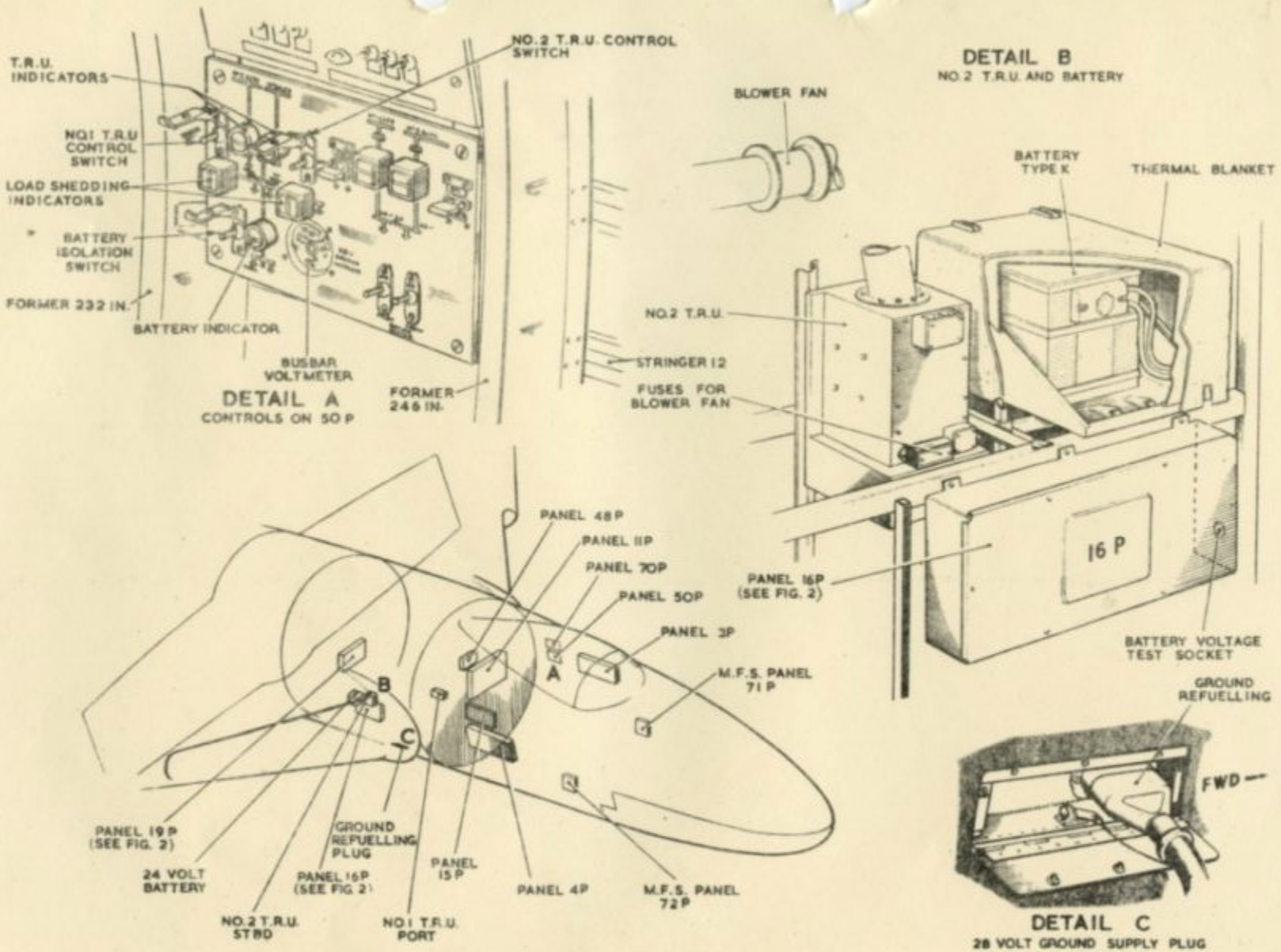
15. Refuelling Supply

28V for the refuelling circuits can be from either the non essential bus bar or from an external source pluged into a separate N.E.T.O. plug. When using the external source the third pin energises relays 450 and 479 which change the feed to the refuelling fuses from the non essential bus bar to the external source.

Component	No. Off.	Location
T.R.U.'s	2	Port & Stbd. Nosewheel Bay
Main Supply Contactor	2	Adjacent to Associated T.R.U.
Reverse Current Relay	2	15P 16P
T.R.U. Control Switch	2	50P
T.R.U. Magnetic Indicator	2	50P
Battery Isolation Cont.	1	19P
Ground Servicing Contactor	1	19P
Load Shedding Contactor	2	15P 16P
Magnetic Indicator	3	50P
Battery Switch	1	50P
Volts Test Socket	1	Nosewheel Bay
Battery Type "K" 2	1	Stbd. Side Nosewheel Bay
Non essential reset switch	1	10P
Voltmeter Sangamo Weston	1	50P


No.3 ALTERNATOR
200 V 3PHASE 400 C P S
No.4 ALTERNATOR
200 V 3PHASE 400 C P S
28 V D.C. ESSENTIAL
COOLING FAN
No.1 T.R.U. CONTROL SOP
No.2 T.R.U. CONTROL SOP
PANEL SOP
No.1 T.R.U. INDICATOR SOP
No.2 T.R.U. INDICATOR SOP
RESET COIL
ESSENTIAL BUS BAR
VITAL BUS BAR
BATTERY BUS BAR
BATTERY ISOLATION CONTACTOR
BATTERY ISOLATION INDICATOR
BATTERY ISOLATION SWITCH SOP
GROUND SERVICE CONTACTOR
GROUND SERVICE PLUG
NON ESSENTIAL LOAD SHEDDING CONTACTOR
VITAL 3P
VITAL 1PP
RELAY 84
OPERATED BY CRASH SWITCHES
BATTERY TEST SOCKET
TO NON ESSENTIAL LOADS
COLOUR KEY


15P
16P
19P
48P
26P
3P
4P
ESSENTIAL BUS BAR
NON ESSENTIAL BUS BAR
COLOUR KEY



LOCATION OF COMPONENTS

DIAGRAM No2:1
A.L.3