PARTS	MATERIALS
BRUSHES AND WIPERS	NICKEL SILVER
RATCHET WHEEL	ALUMINIUM BRONZE 10% Al 90% Cu
PAWL	HARDENED STEEL
PAWL SPRING	SPRING STEEL
WIPER SPINDLE	STEEL
RESIDUAL PLATE	STAINLESS STEEL
INTERRUPTER CONTACTS	TUNGSTEN (PLATINUM ON NON-HOMING TYPES)
INTERRUPTER STRIKER	BAKELITE
RESTORING SPRINGS	STEEL

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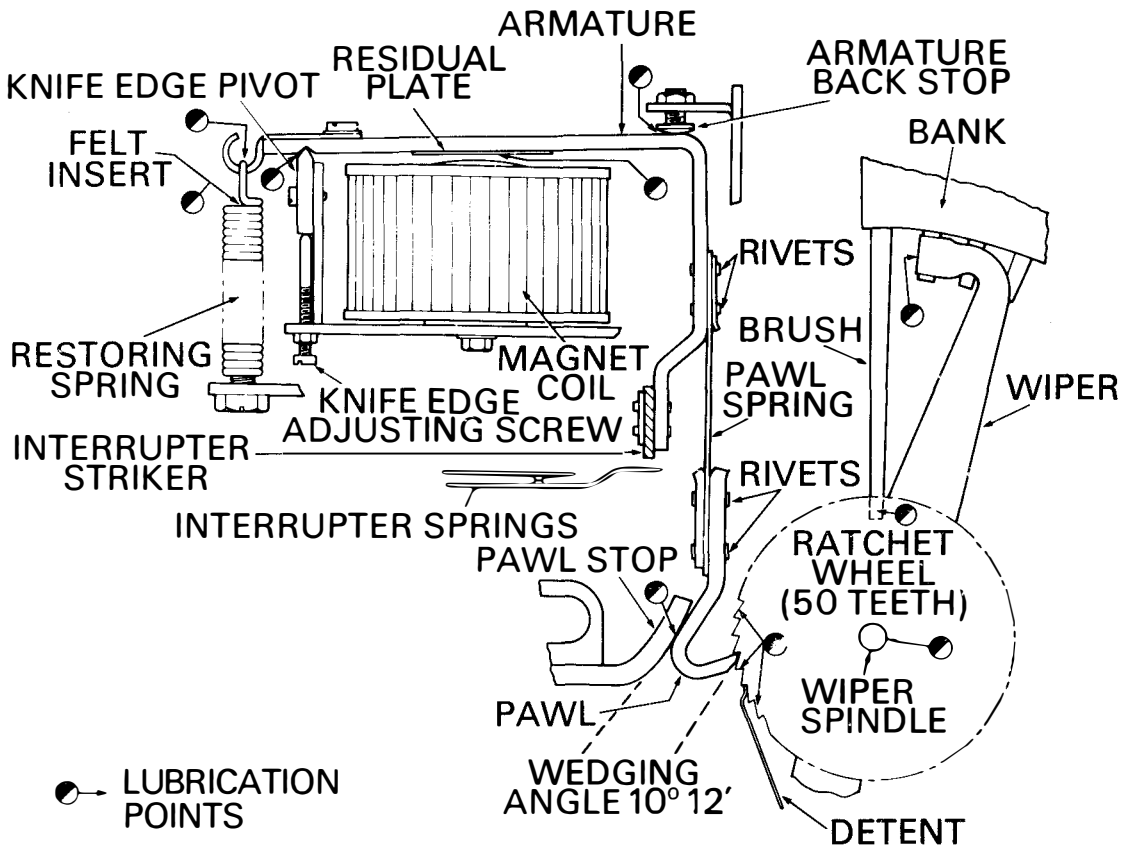
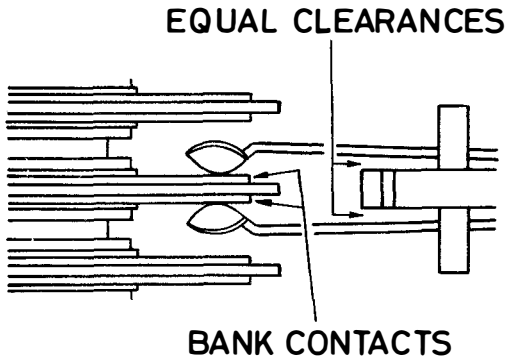
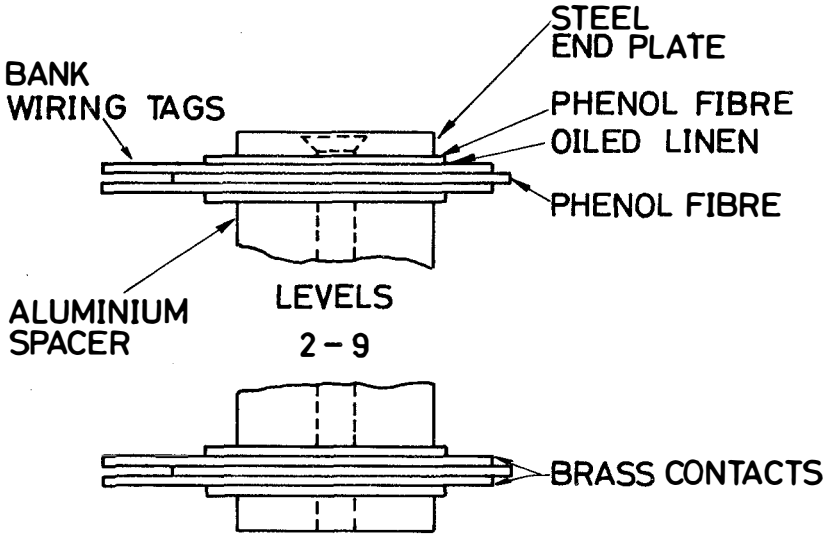


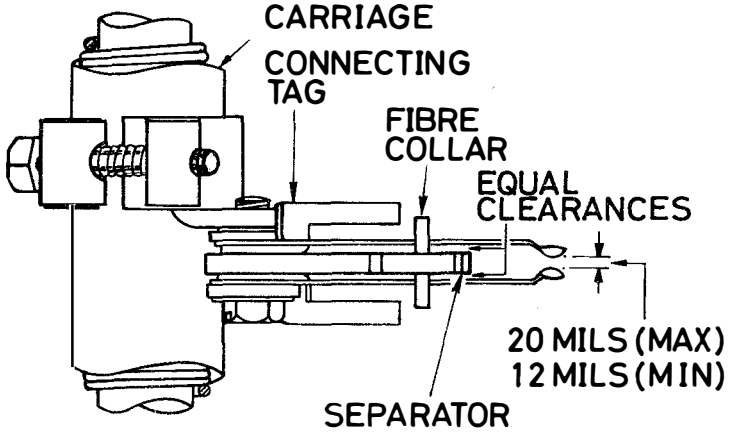
Fig. 1-1 Details of Uniselector Mechanism



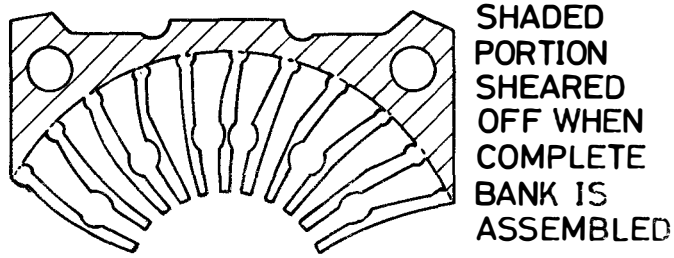
ALIGNMENT OF WIPER



BANK CONSTRUCTION



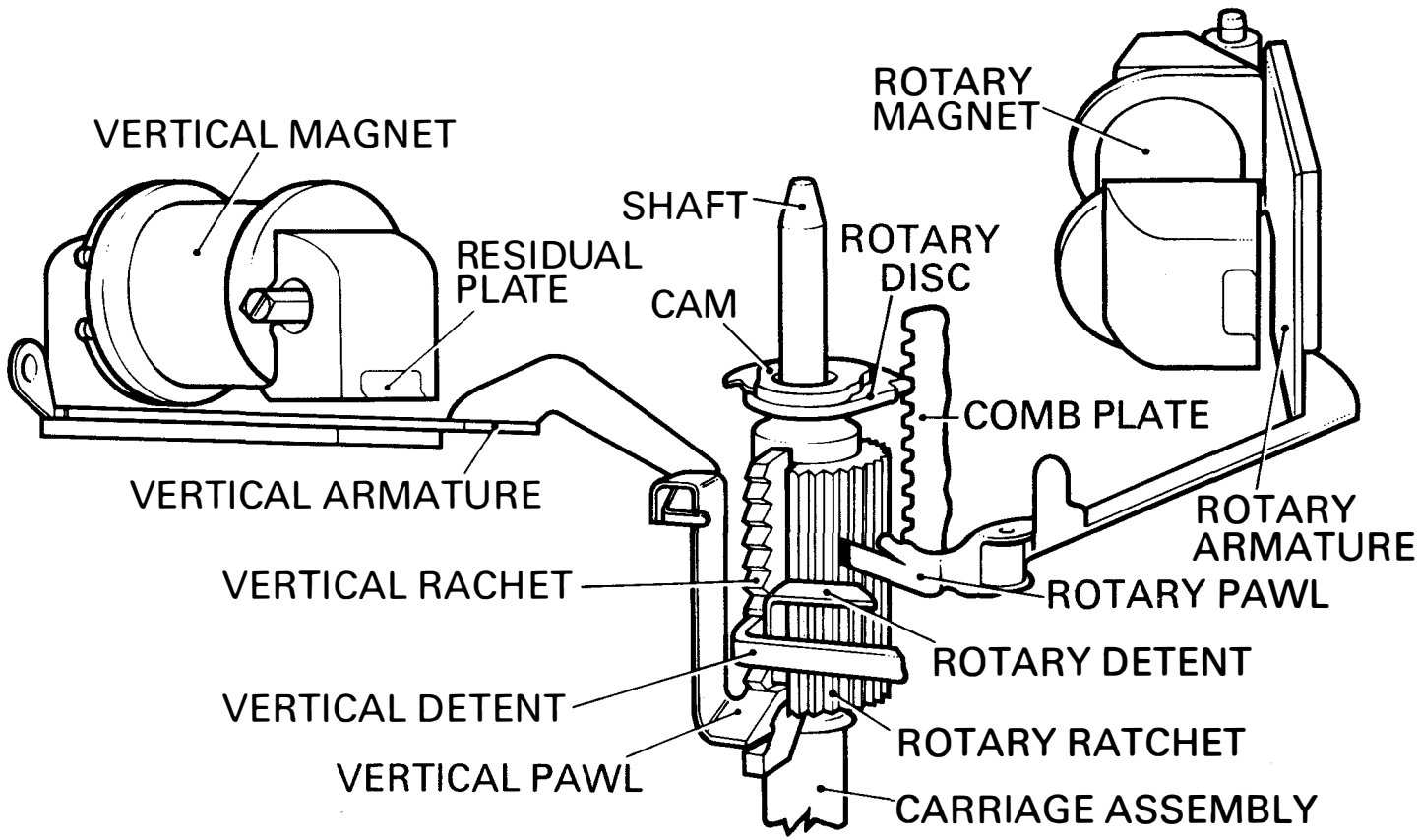
WIPER DETAILS



BANK CONTACT SEGMENT

R36724 A

Fig. 1-2 Design of Selector Banks and Wipers



PART	MATERIAL
SELECTOR FRAME	DIECAST ALUMINIUM SILICON ALLOY
VERTICAL RACHET	CASE HARDENED STEEL
ROTARY RATCHET	HARD BRASS
MAGNET CORES	CAST IRON
PIECE PARTS	MILD STEEL PRESSINGS

PART	MATERIAL
MAGNET ARMATURES	PLATE OF ANNEALED SWEDISH IRON RIVETED TO A MILD STEEL PRESSING
SHAFT	BRIGHT STEEL
PAWLS	CASE HARDENED STEEL
RESIDUAL PLATES	BRASS

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Fig. 1-3 Details of Selector Mechanism

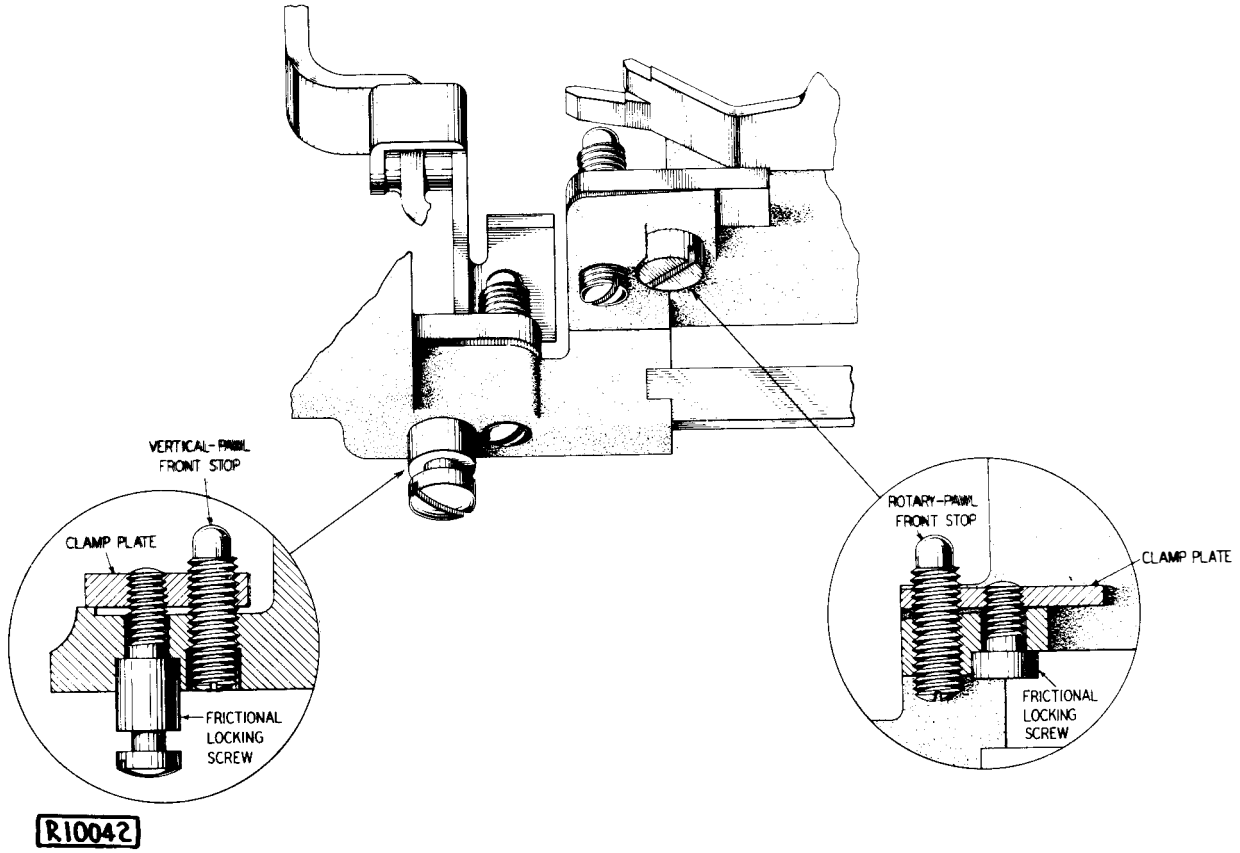


Fig. 1-4 Use of Friction-Locked Adjusting Screws for Vibration Protection on Selectors.

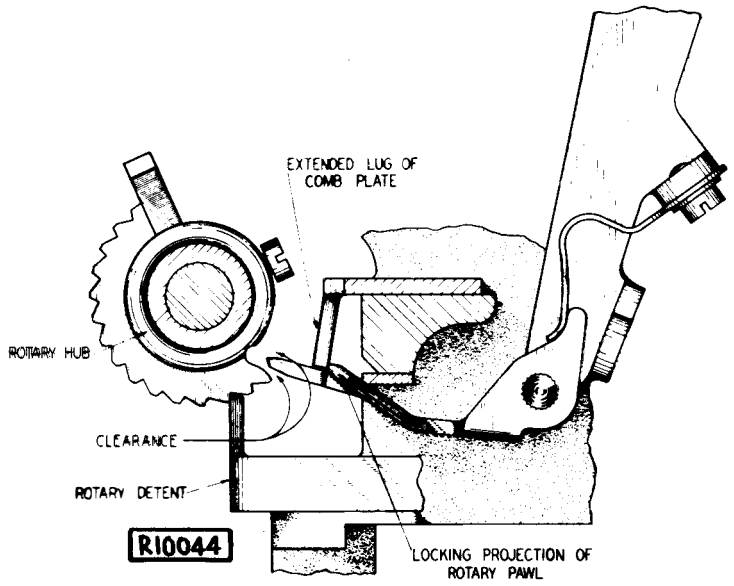


Fig. 1-5 Method of Preventing Wear on 12th Rotary Ratchet Tooth of Selector Carriage-Rotary Armature Held Operated on 13th Operation.

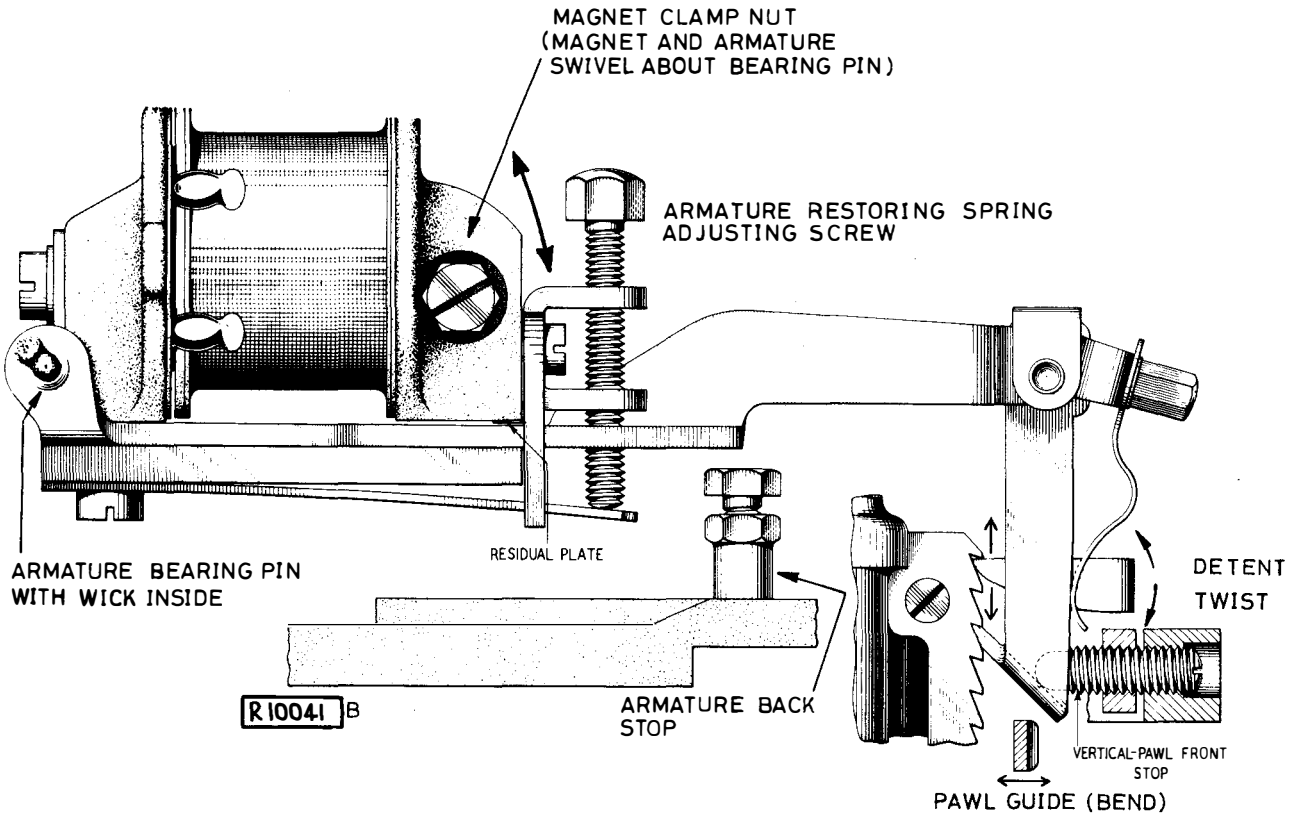


Fig. 1-6 Some Bending and Screw Adjustments on the BPO 2000 Type Selector Vertical Magnet Assembly.

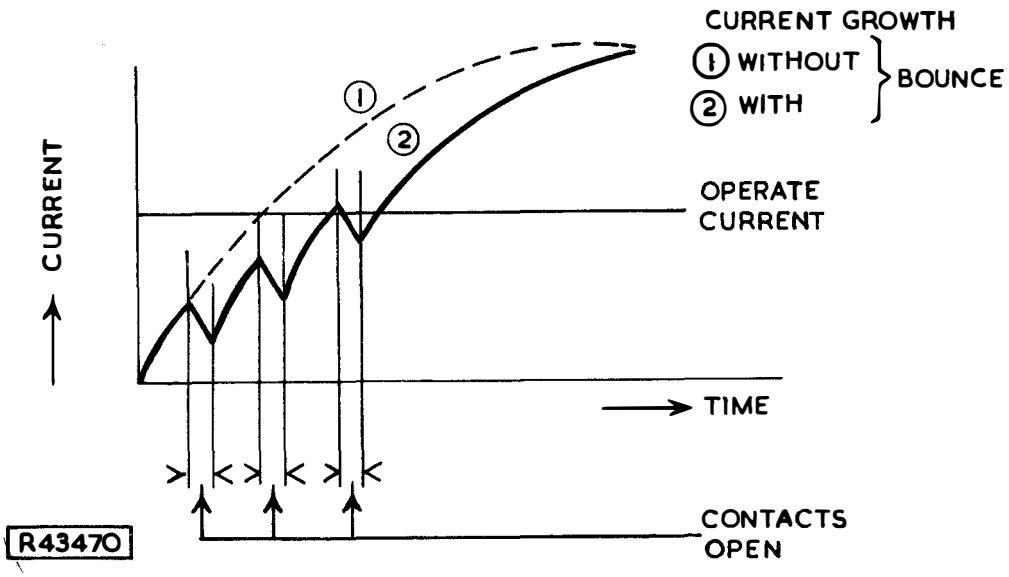


Fig. 1-7 Effect of Contact Bounce on Relay Operating Time

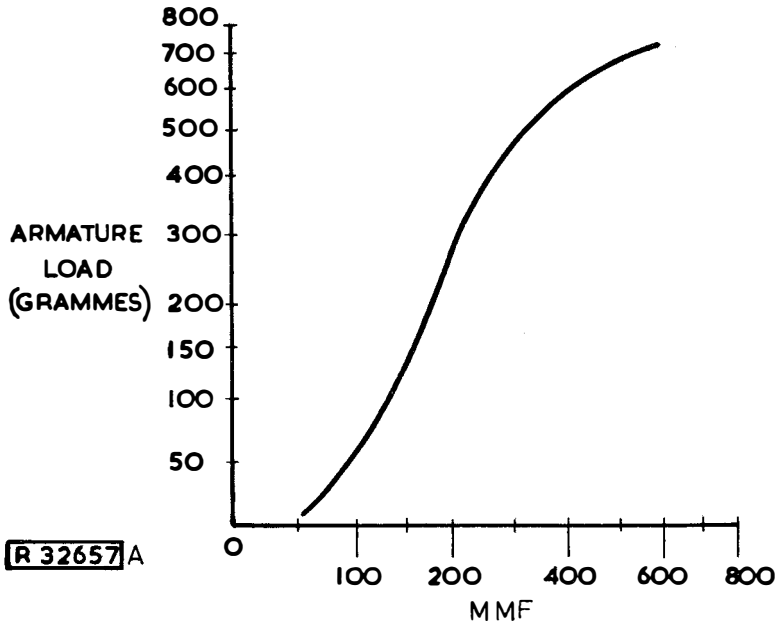


Fig. 1-8 Relationship in a particular relay between the Armature Load and the MMF required to move the Armature.

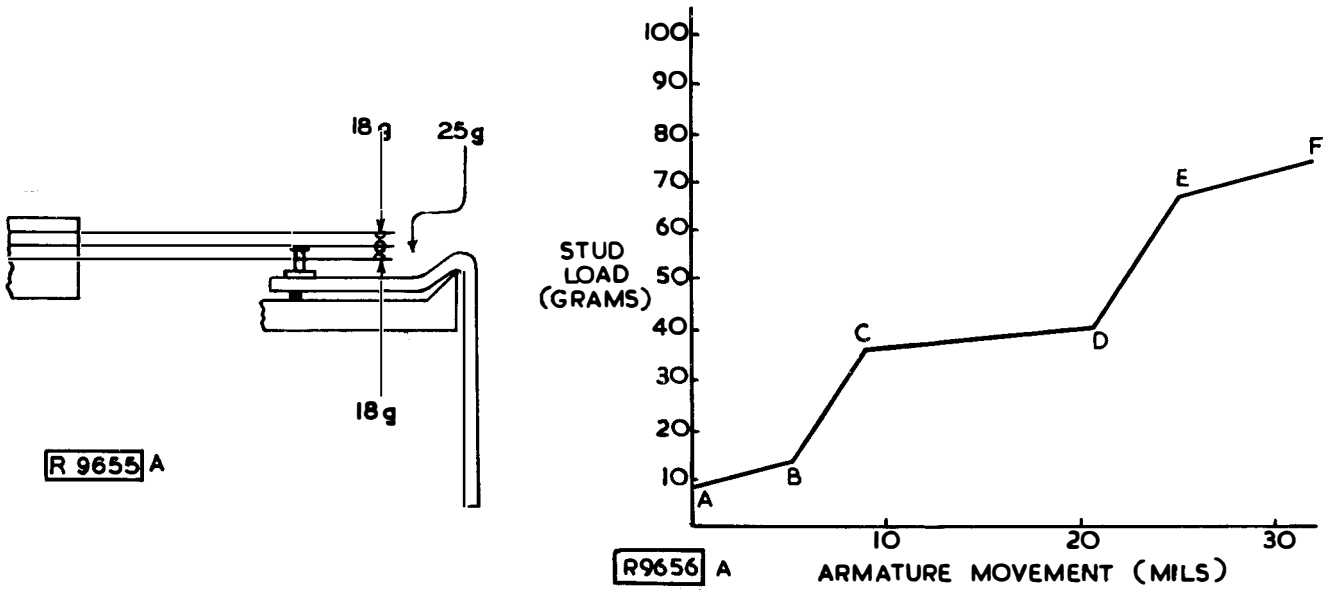


Fig. 1-9 Relay Contact Pressures and Load/Armature Movement Graph

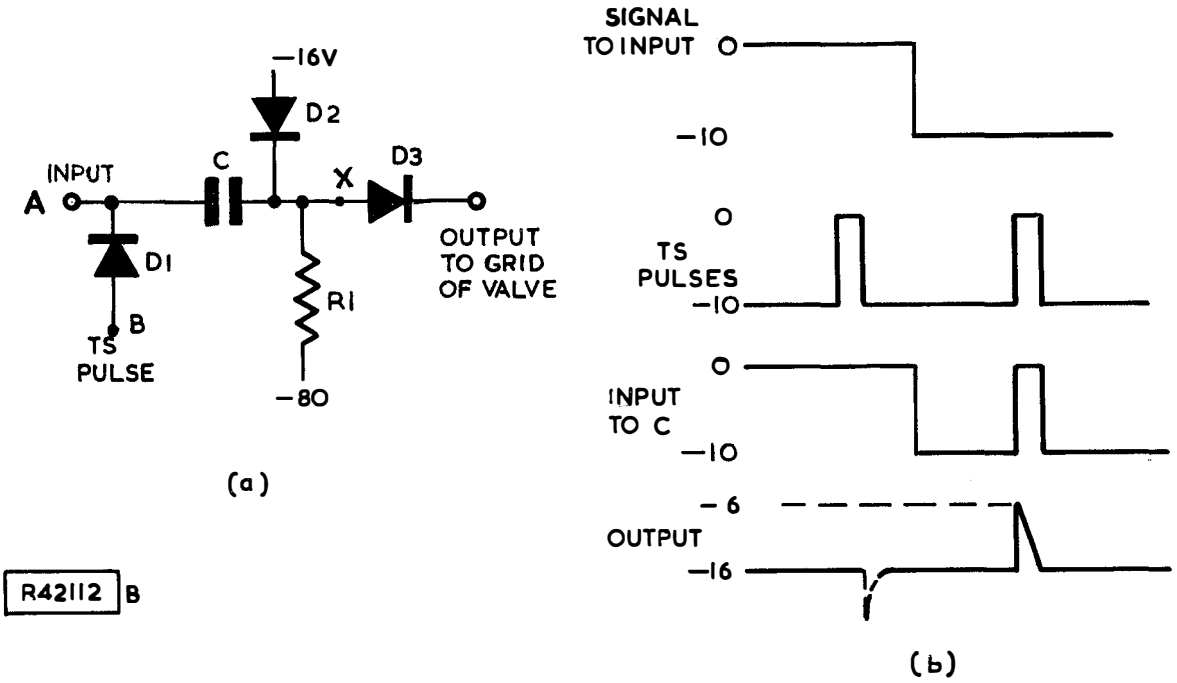


Fig. 2-1 Diode Gate Circuit. Used as an input circuit for Toggles. Produces a single positive going pulse under a master control for a permanent change in its own input.

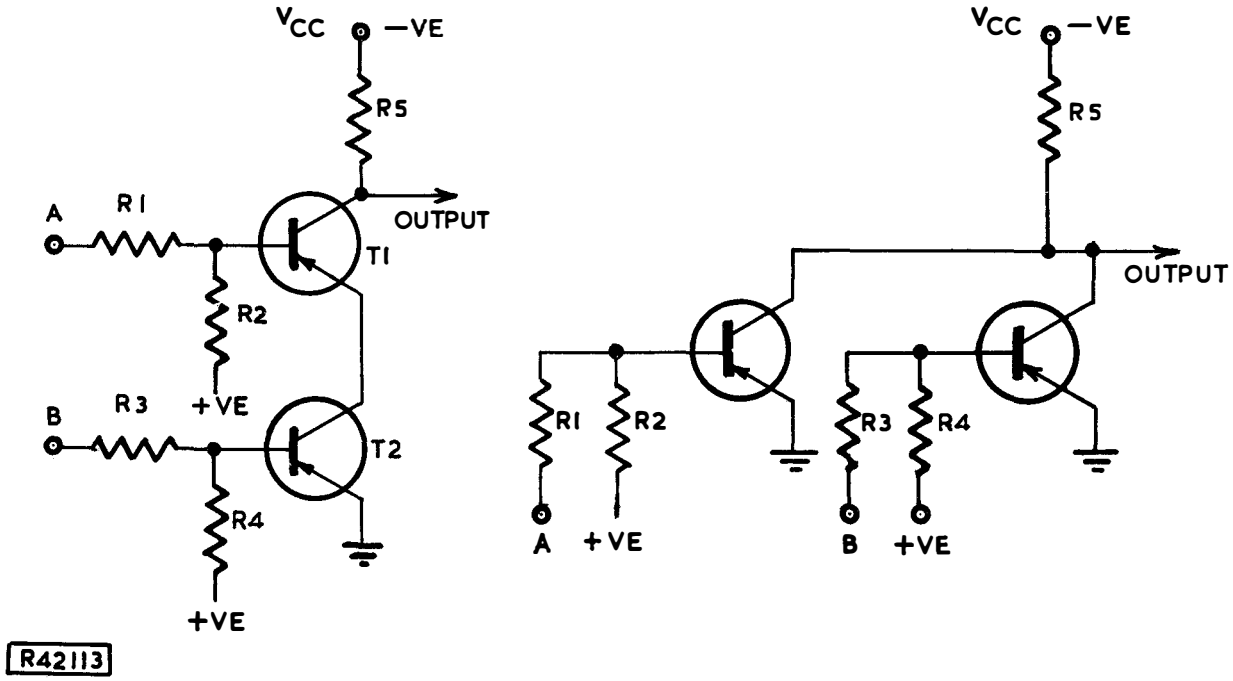


Fig. 12-2 (a) Two input NAND Gate

(b) Two input NOR Gate

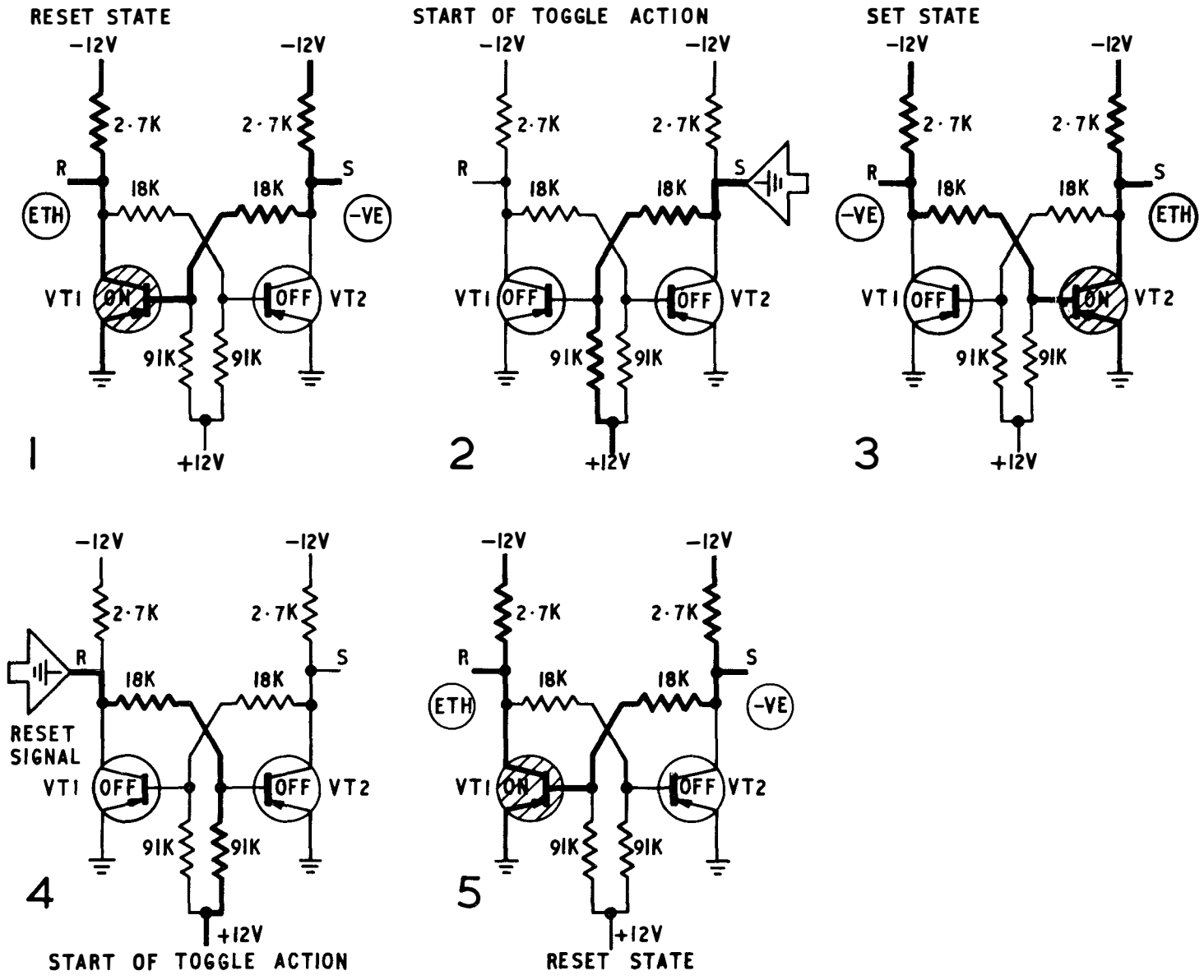


Fig. 2-3 Operation of Bistable or Toggle Circuit

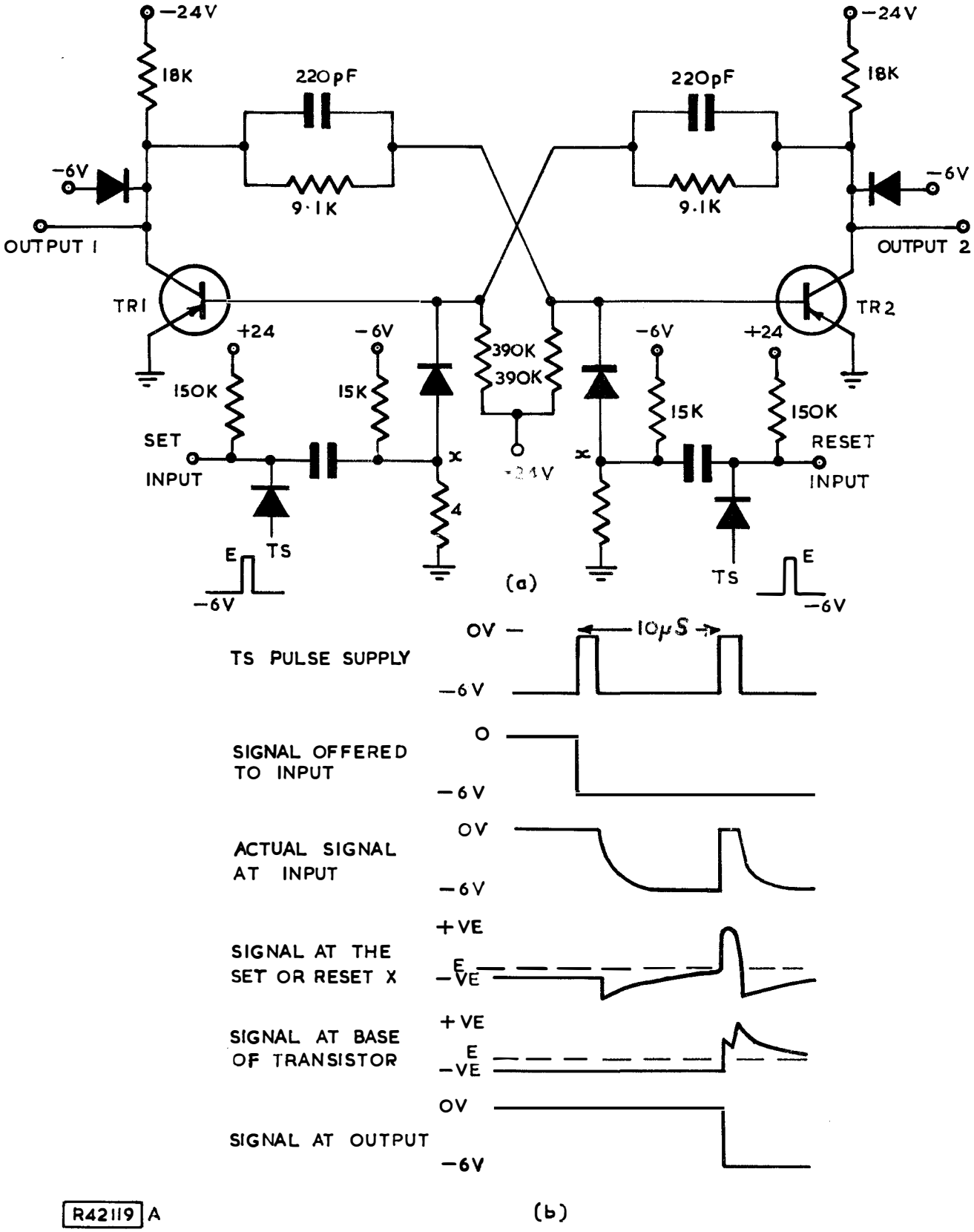
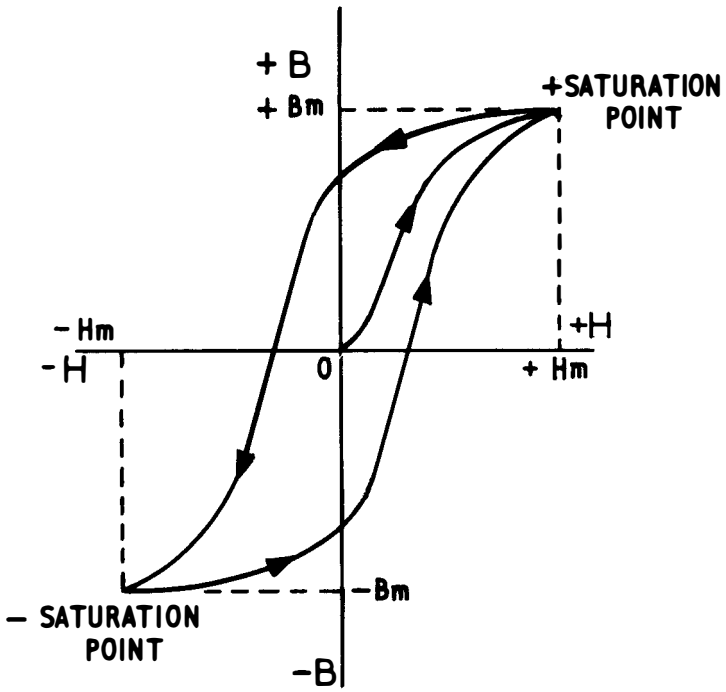


Fig. 2-4 Practical Transistor Toggle Circuit



HYSTERESIS LOOP OF MATERIAL UNSUITABLE FOR LOGIC STORAGE

HYSTERESIS LOOP OF FERROMAGNETIC MATERIAL SUITABLE FOR LOGIC STORAGE

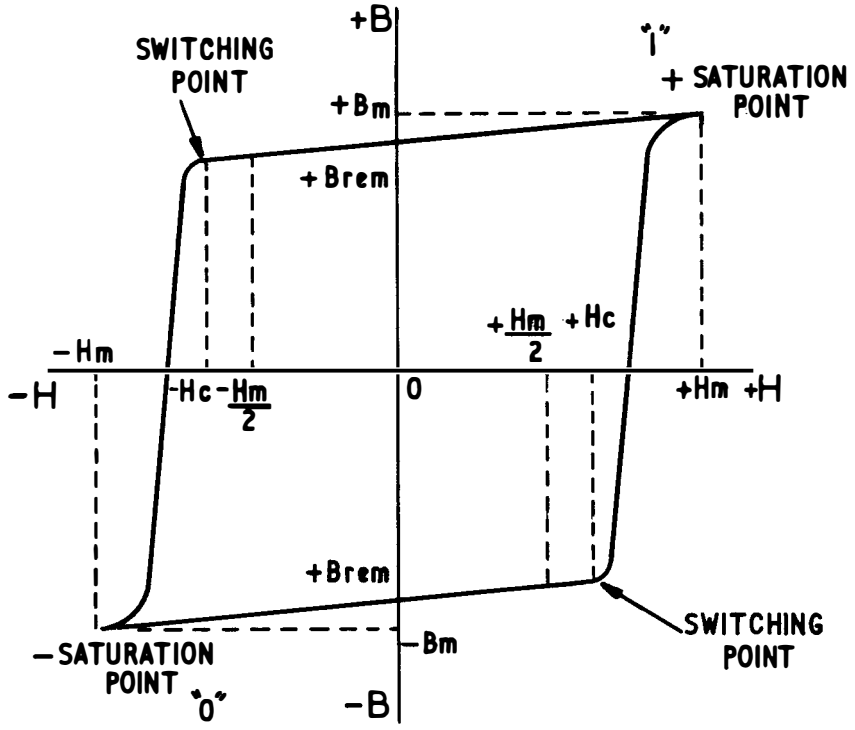


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Fig. 2-5 Hysteresis Loops

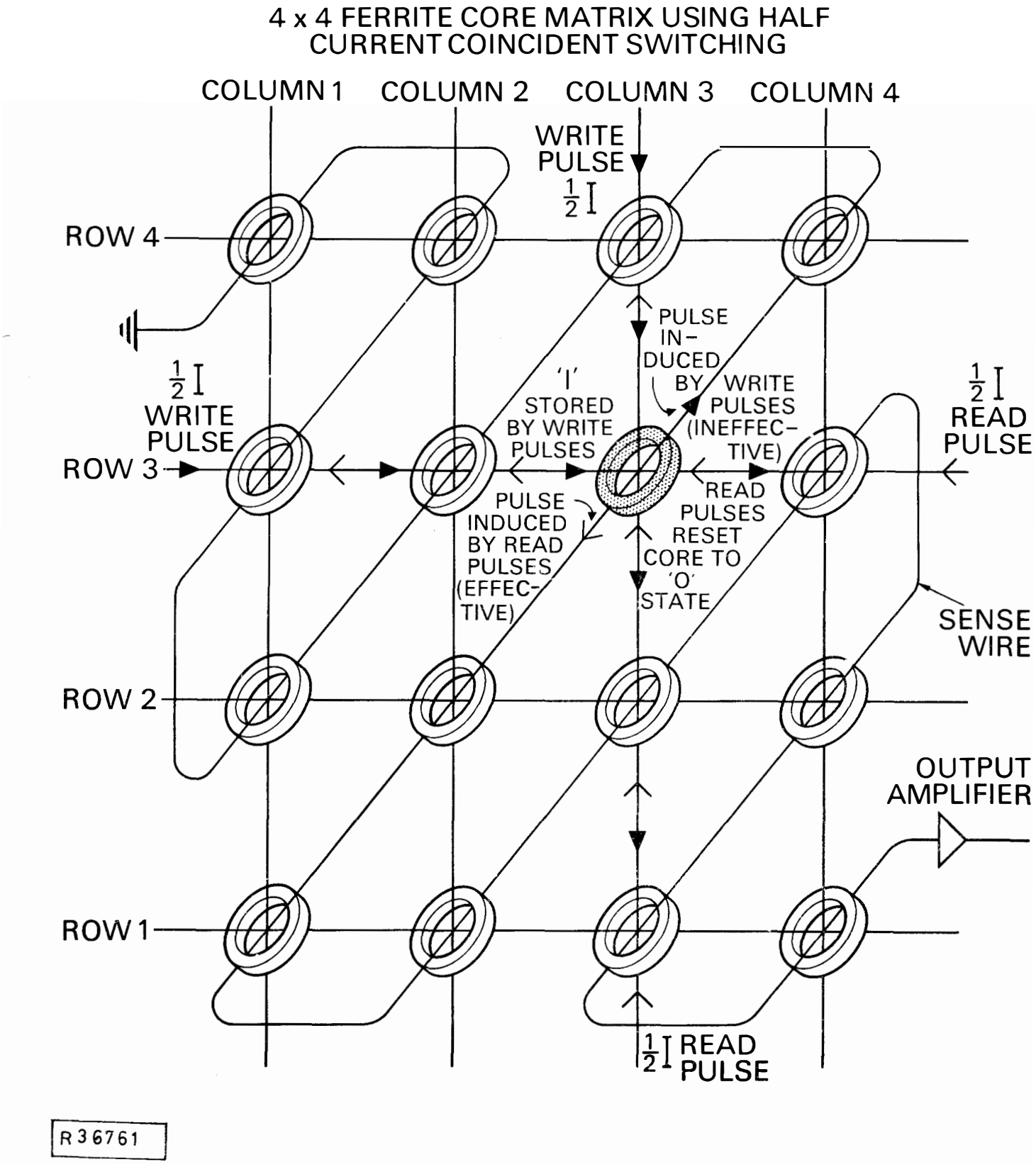


Fig. 2-6 Principle of Ferrite Core Storage

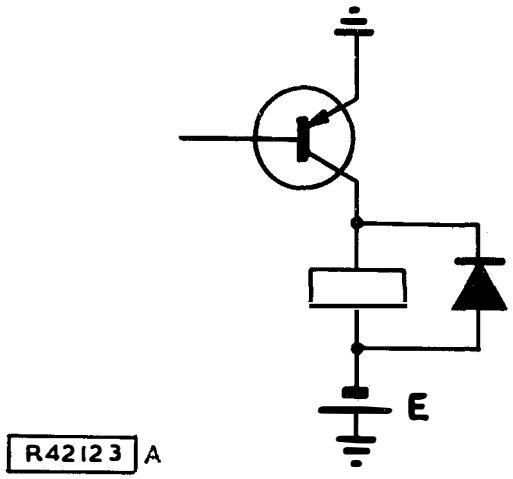


Fig. 2-7 Use of a Shunt Diode to protect a transistor (aiding the operation of a relay) against the voltage surge caused by relay inductance when it releases.

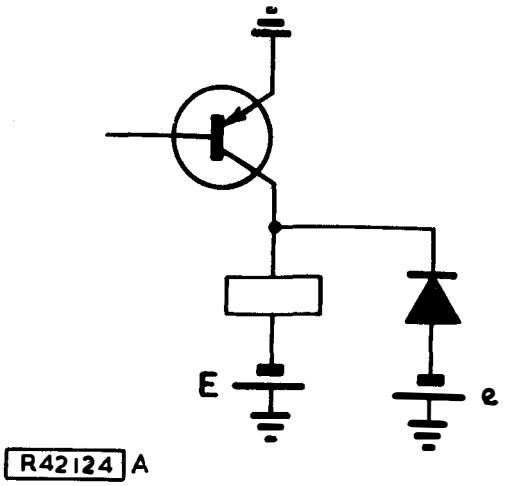
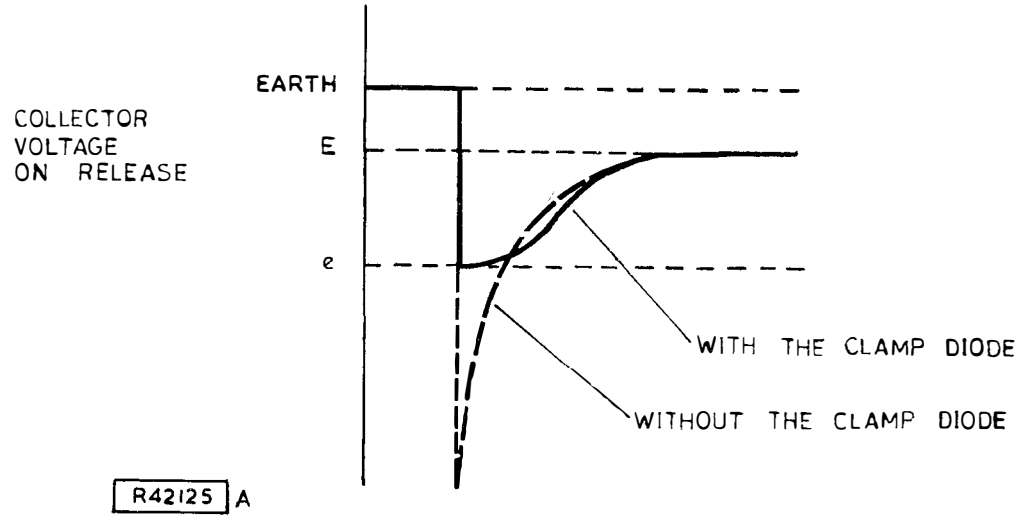


Fig. 2-8 Use of Clamp Diode for same conditions as Fig. 2-7.

Voltage e > E

Fig. 2-9 voltage waveforms (collector) under the release condition of the relay in Fig. 2-8; showing effect of clamping.



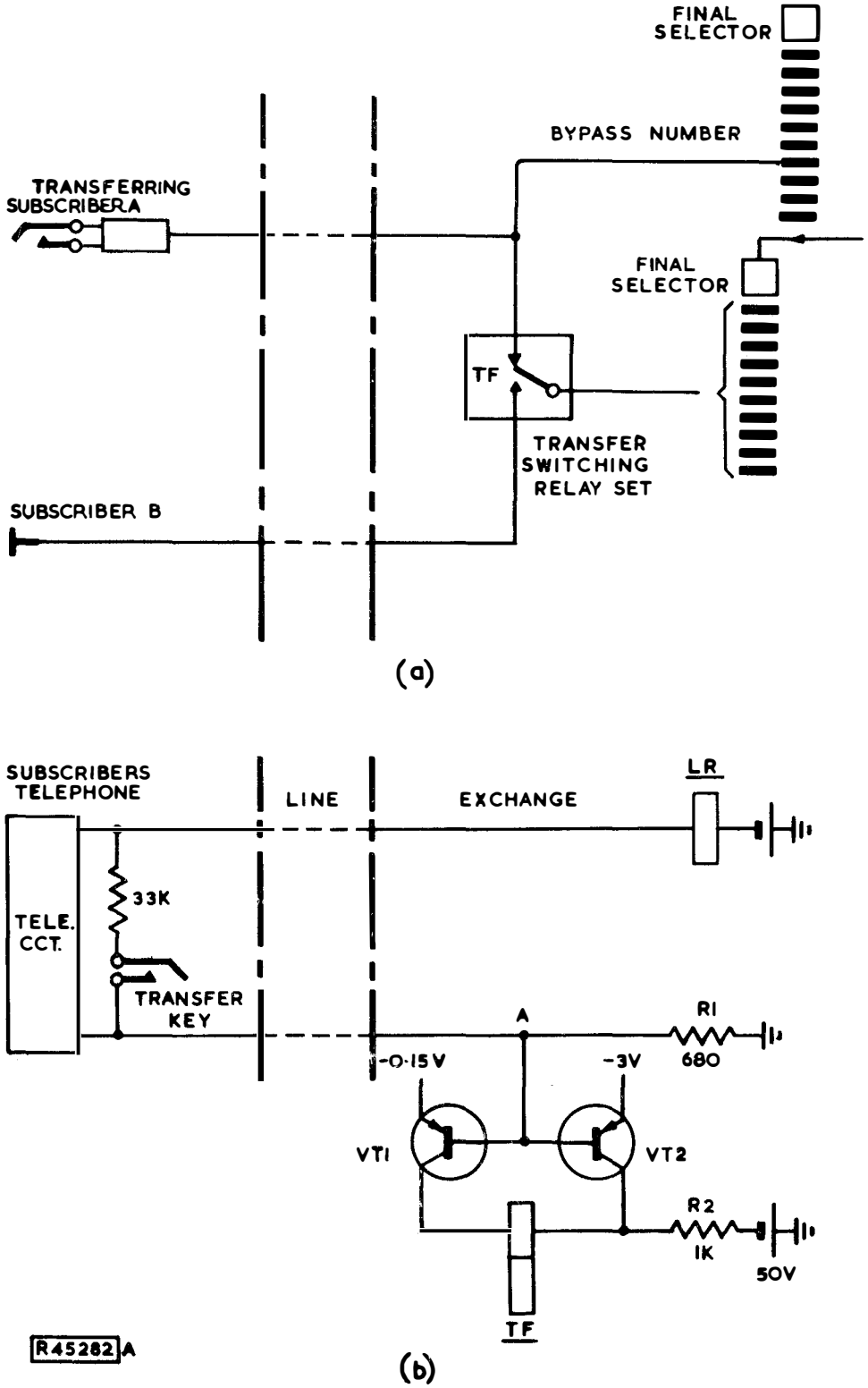


Fig. 2-10 Practical example of a transistor controlling a relay in the Subscriber Operated Transfer Service.

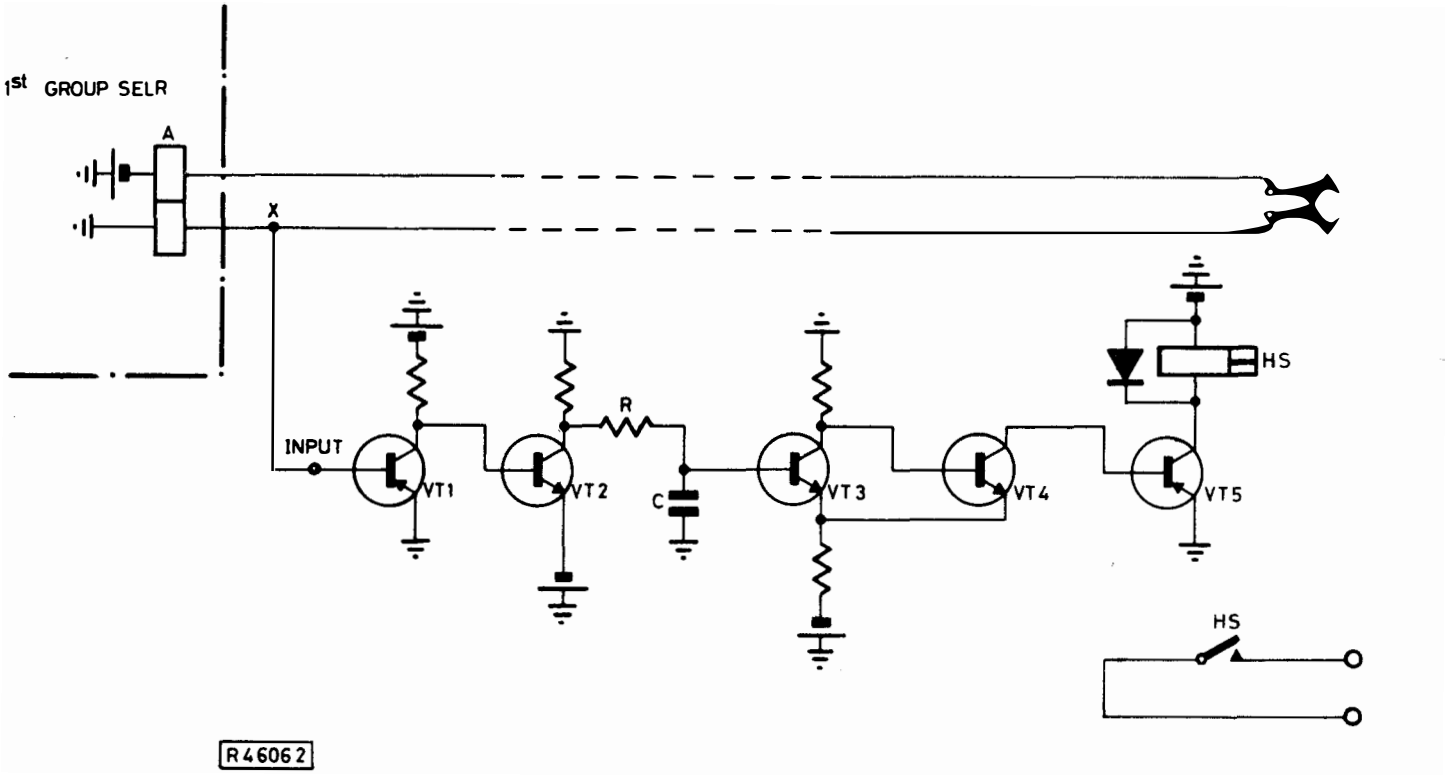


Fig. 2-11 Transistorized control of a relay in a Dial Pulse Monitoring circuit

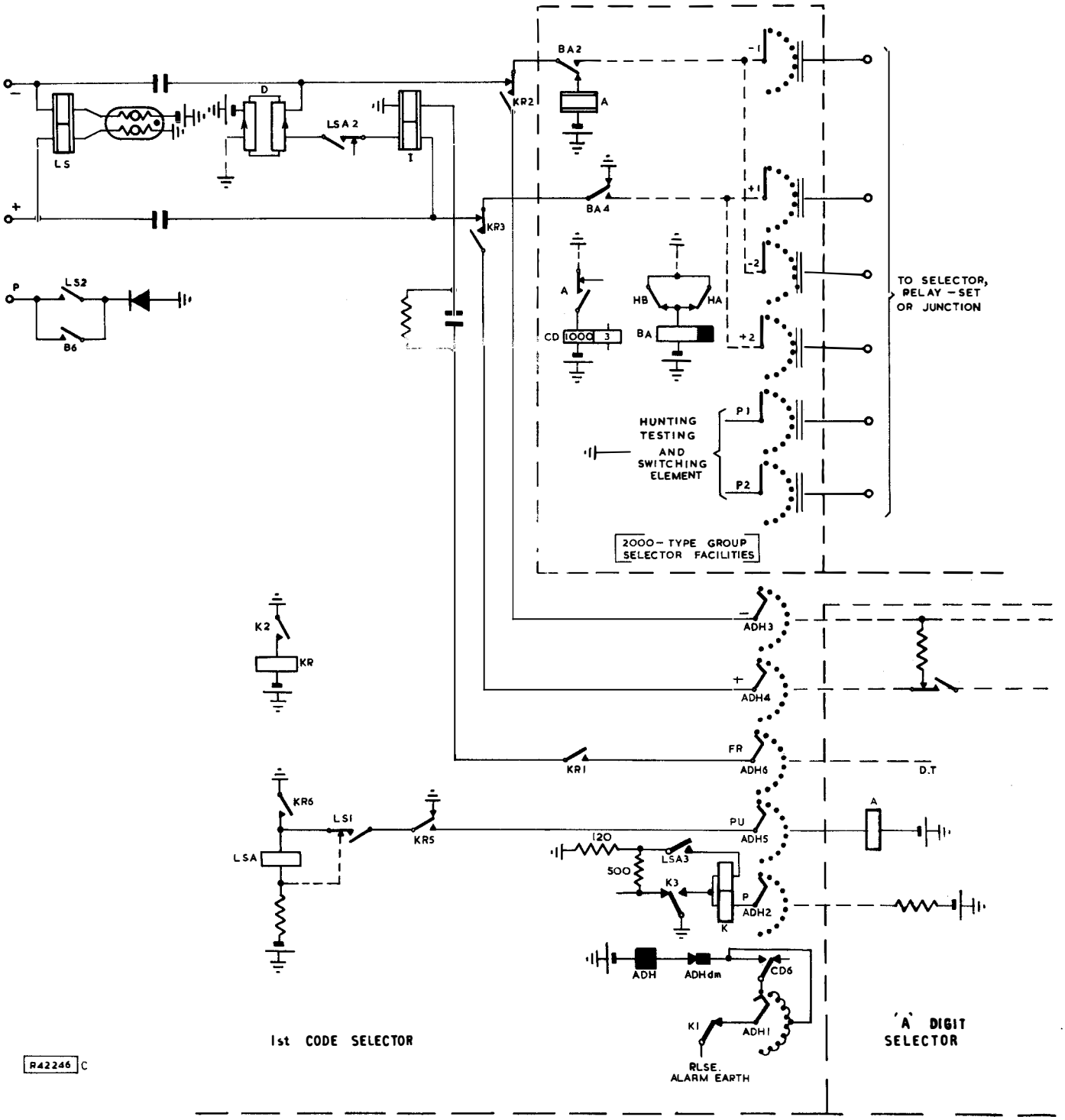


Fig. 3-1 Seizure and Pulsing Element of 1st Code Selector

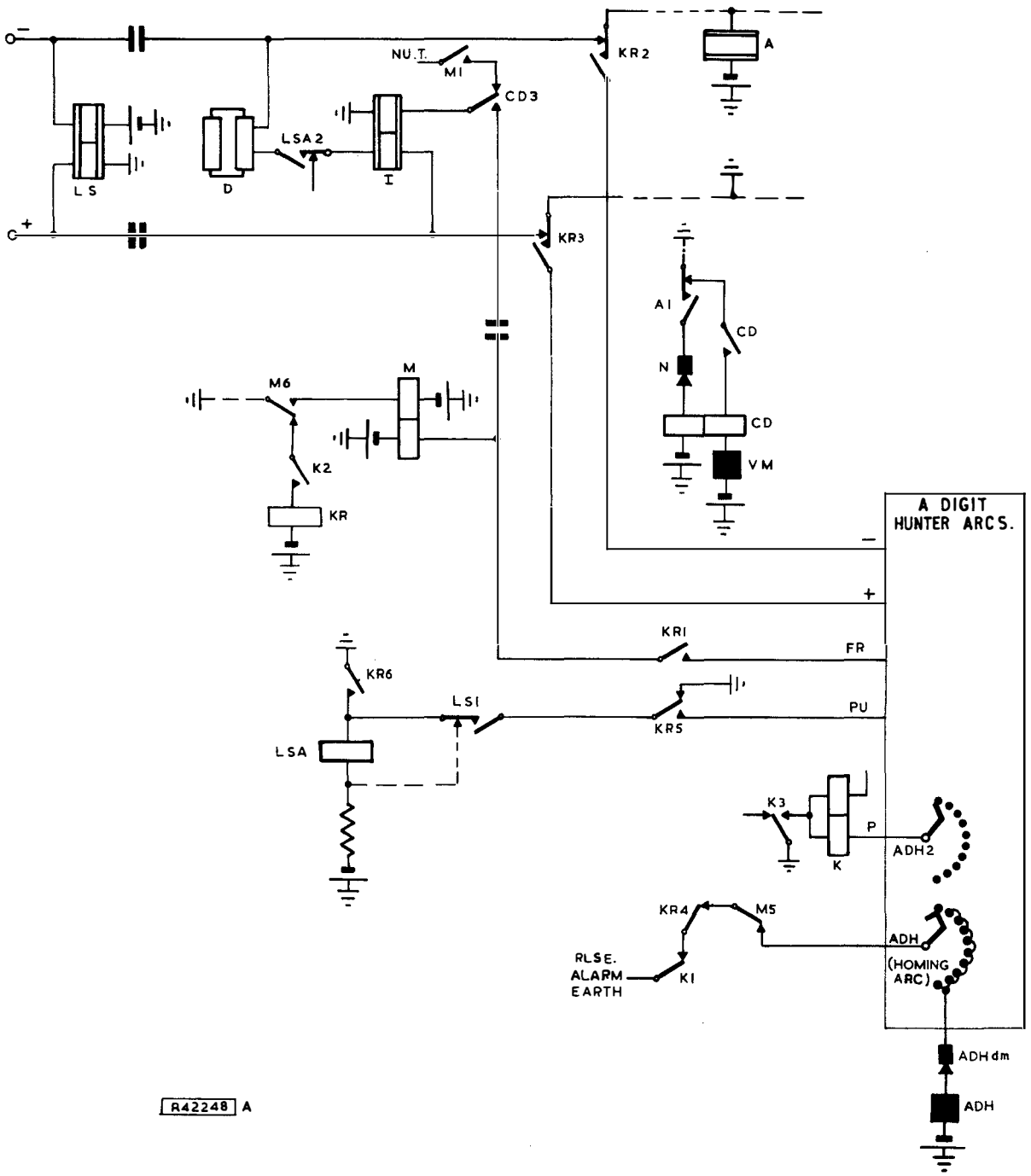


Fig. 3-2 Forced Release Circuit Element of 1st Code Selector

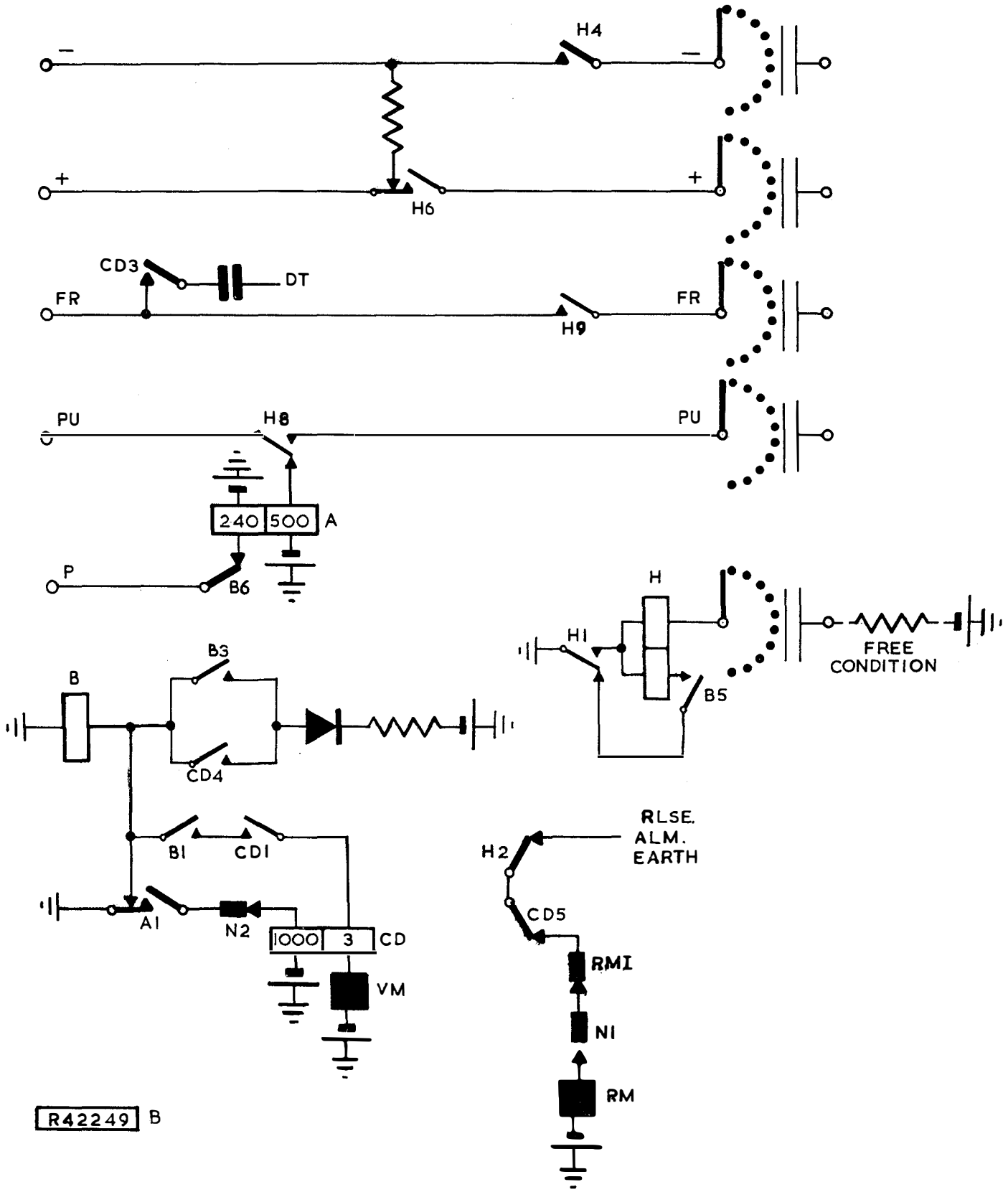


Fig. 3-3 Seizure and Pulsing Circuit Element of 'A' Digit Selector

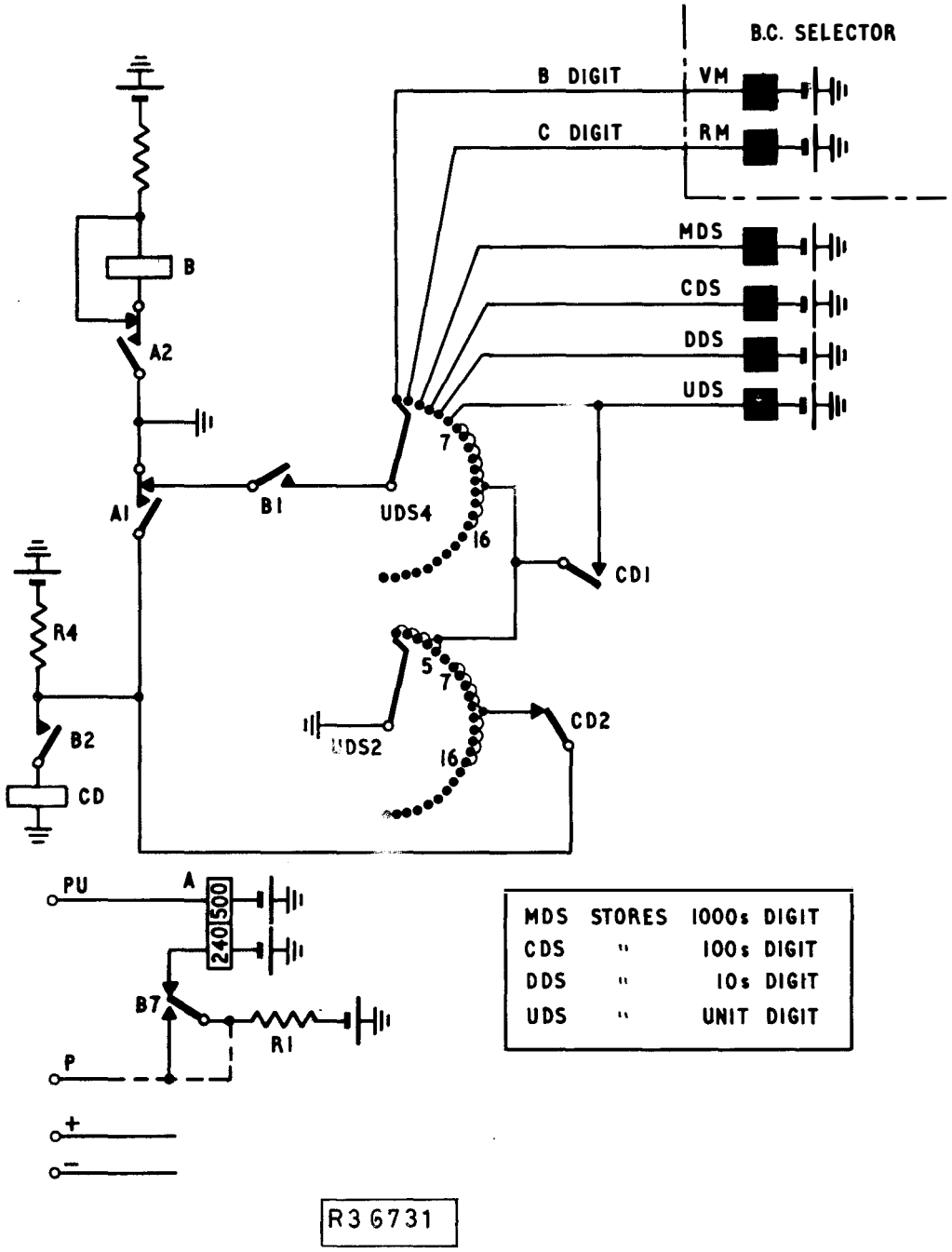


Fig. 3-4 Pulsing-in Circuit Element of Director

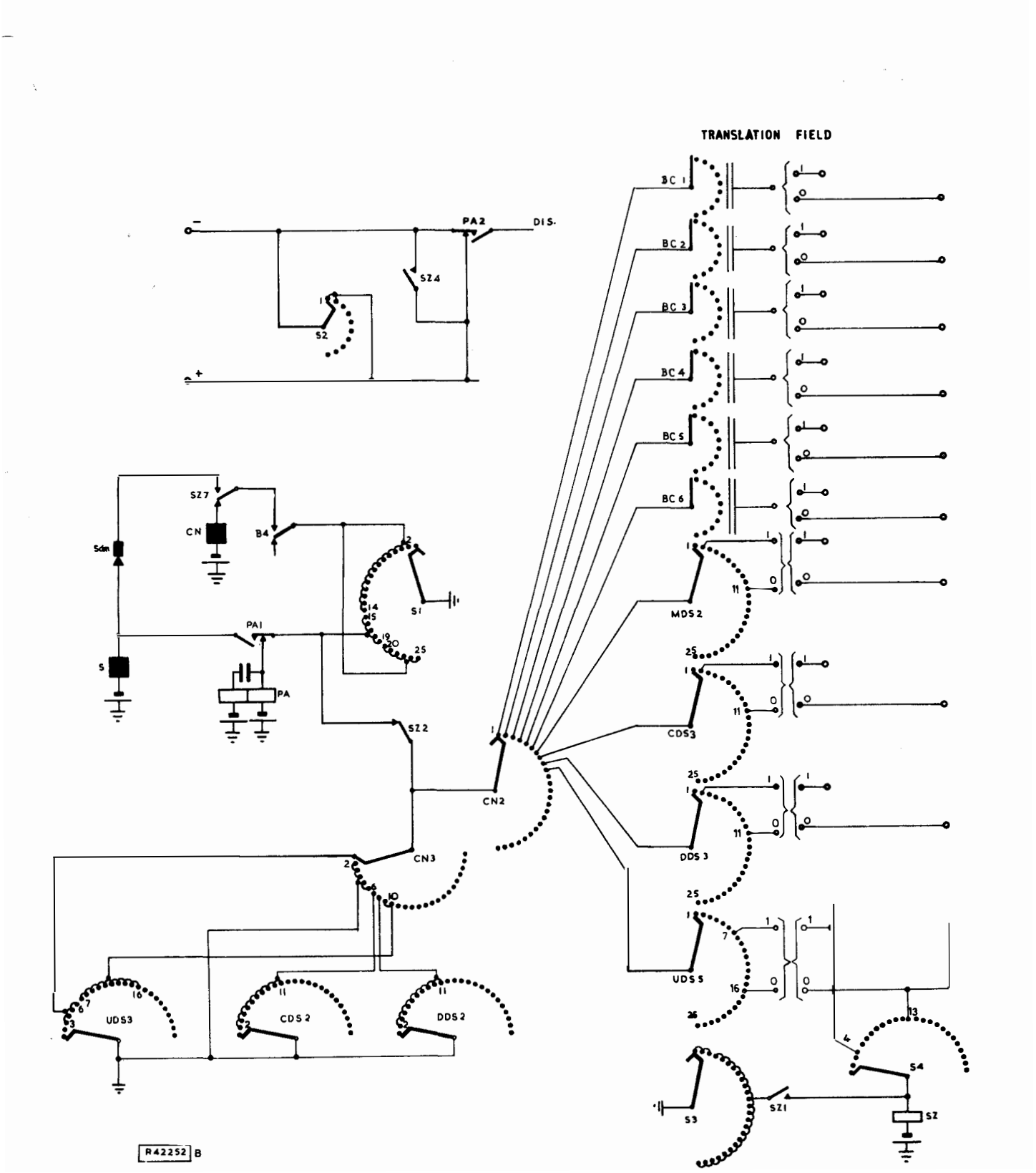


Fig. 3-5 Director Translation

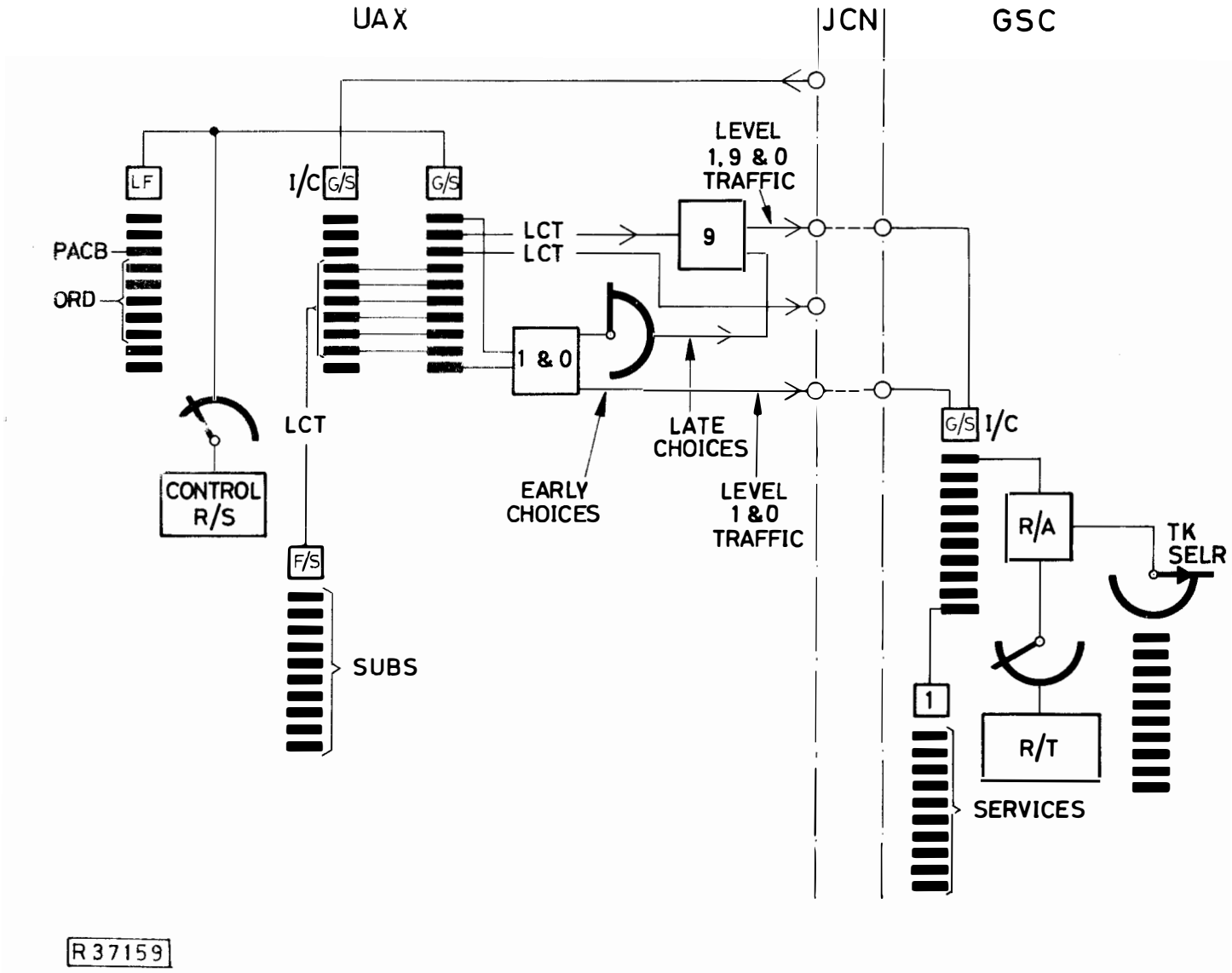
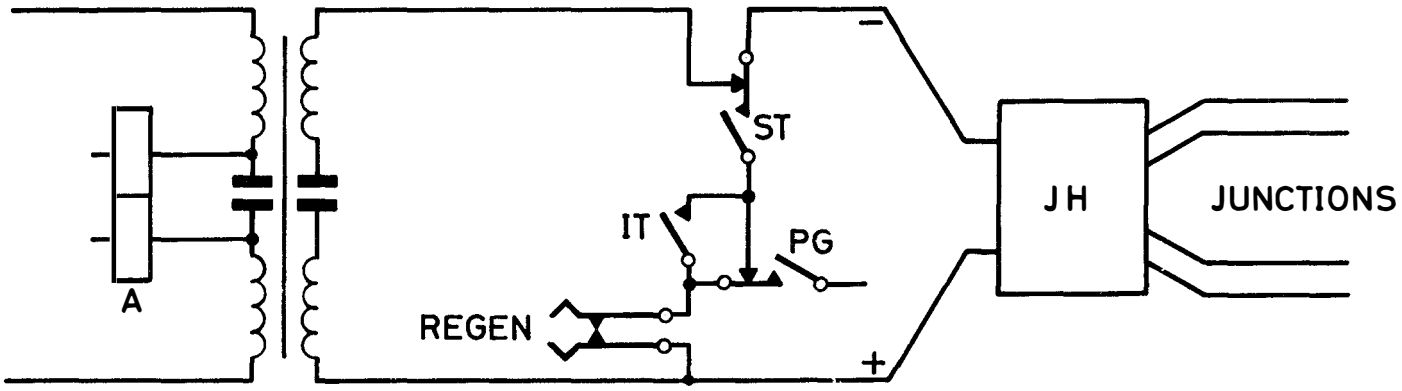
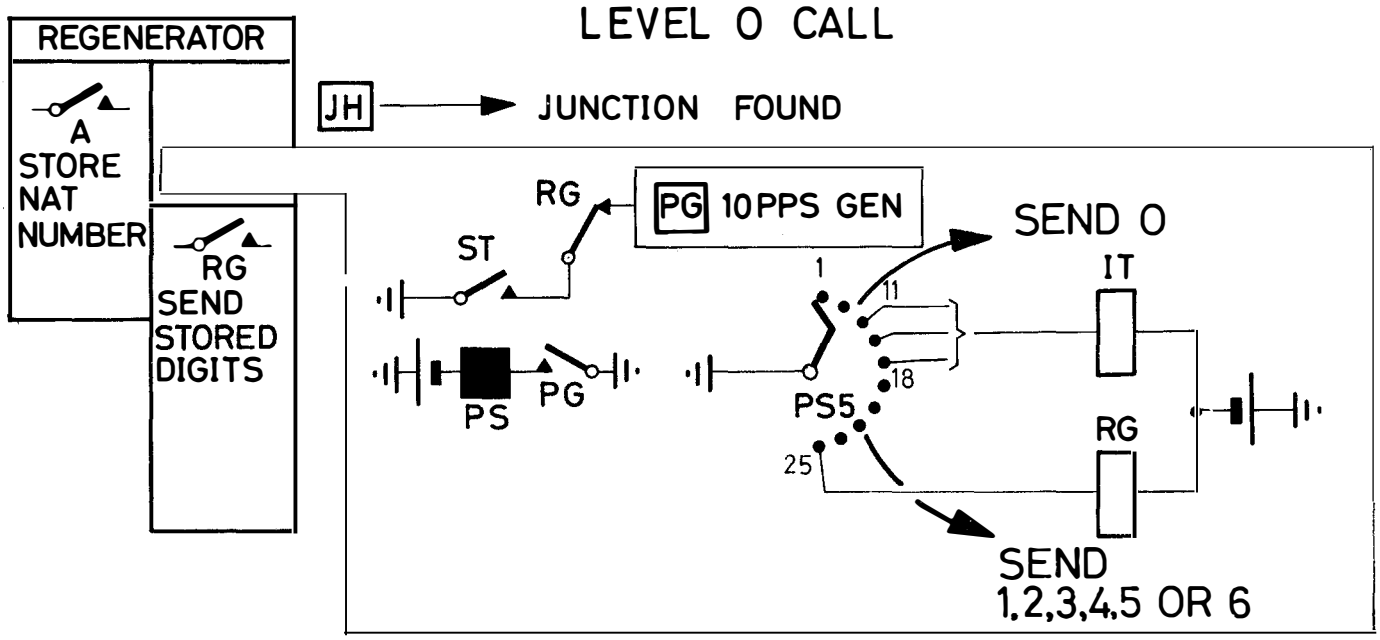


Fig. 4-1 600 Line UAX with STD





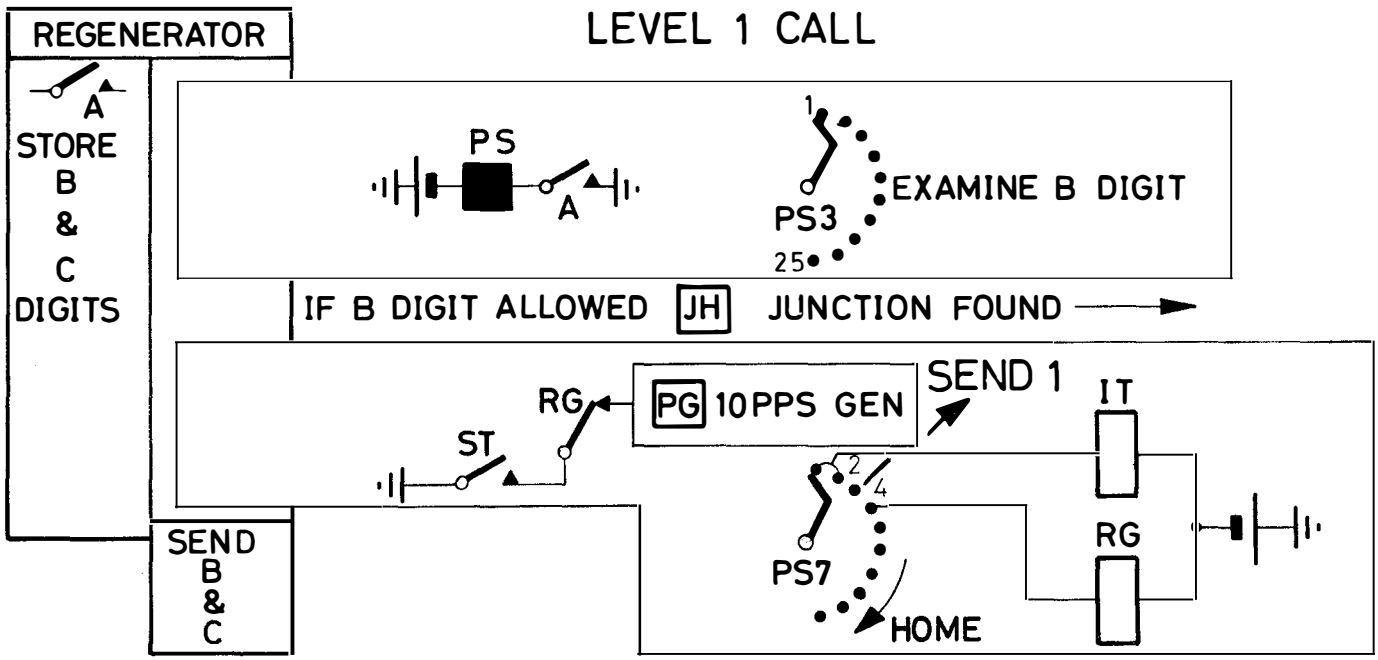


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Fig. 4-2 600 Line UAX. Principle of Level 1 and 0 calls

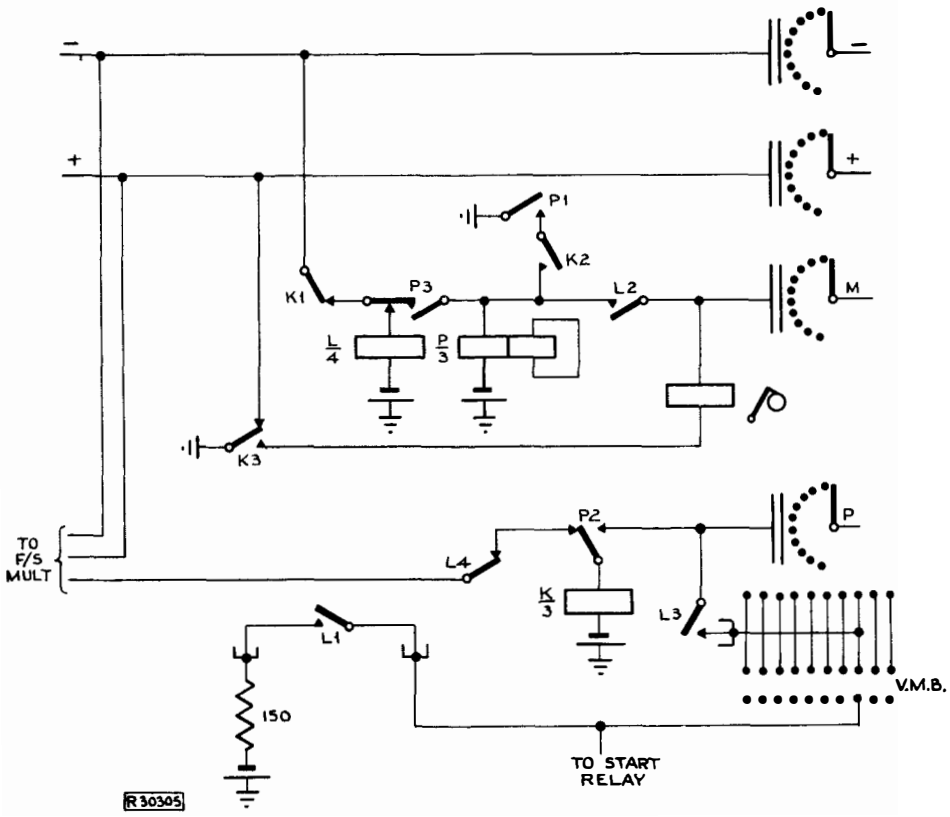


Fig. 4-3 UAX 13 Subscriber's Line Circuit

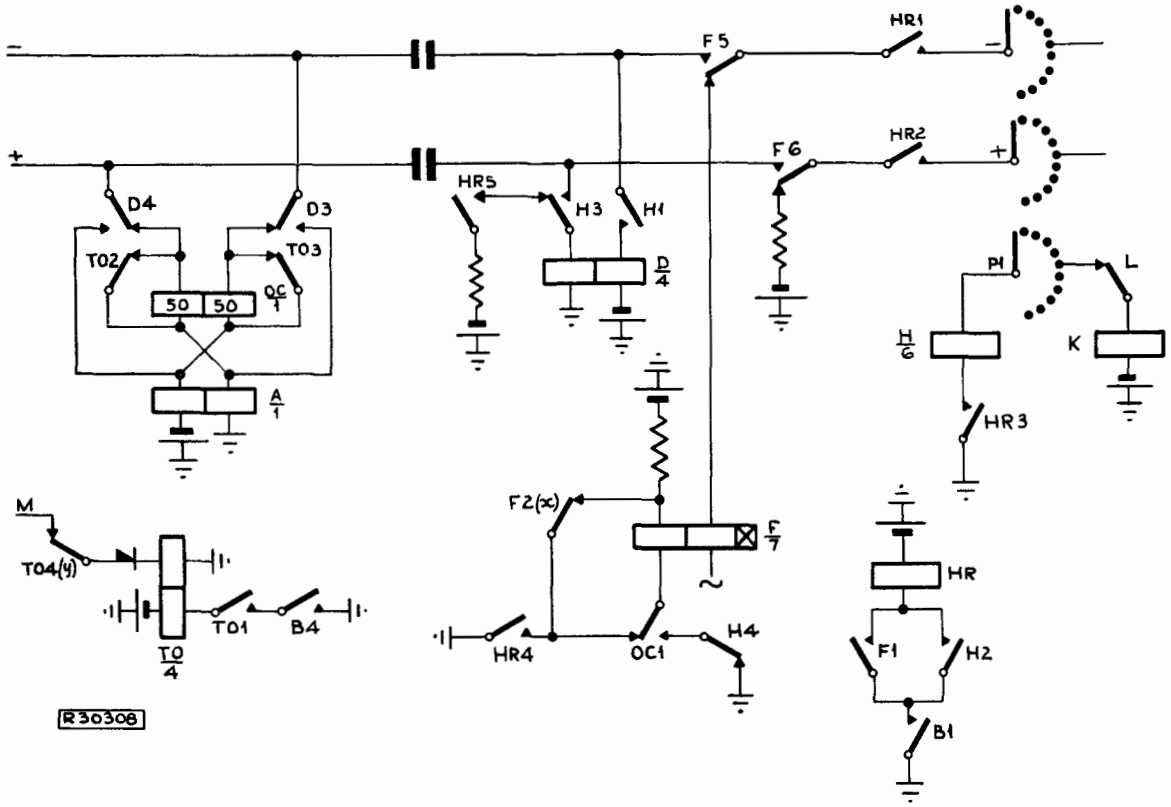


Fig. 4-4 UAX 13 Final Selector showing Trunk Offering Facility

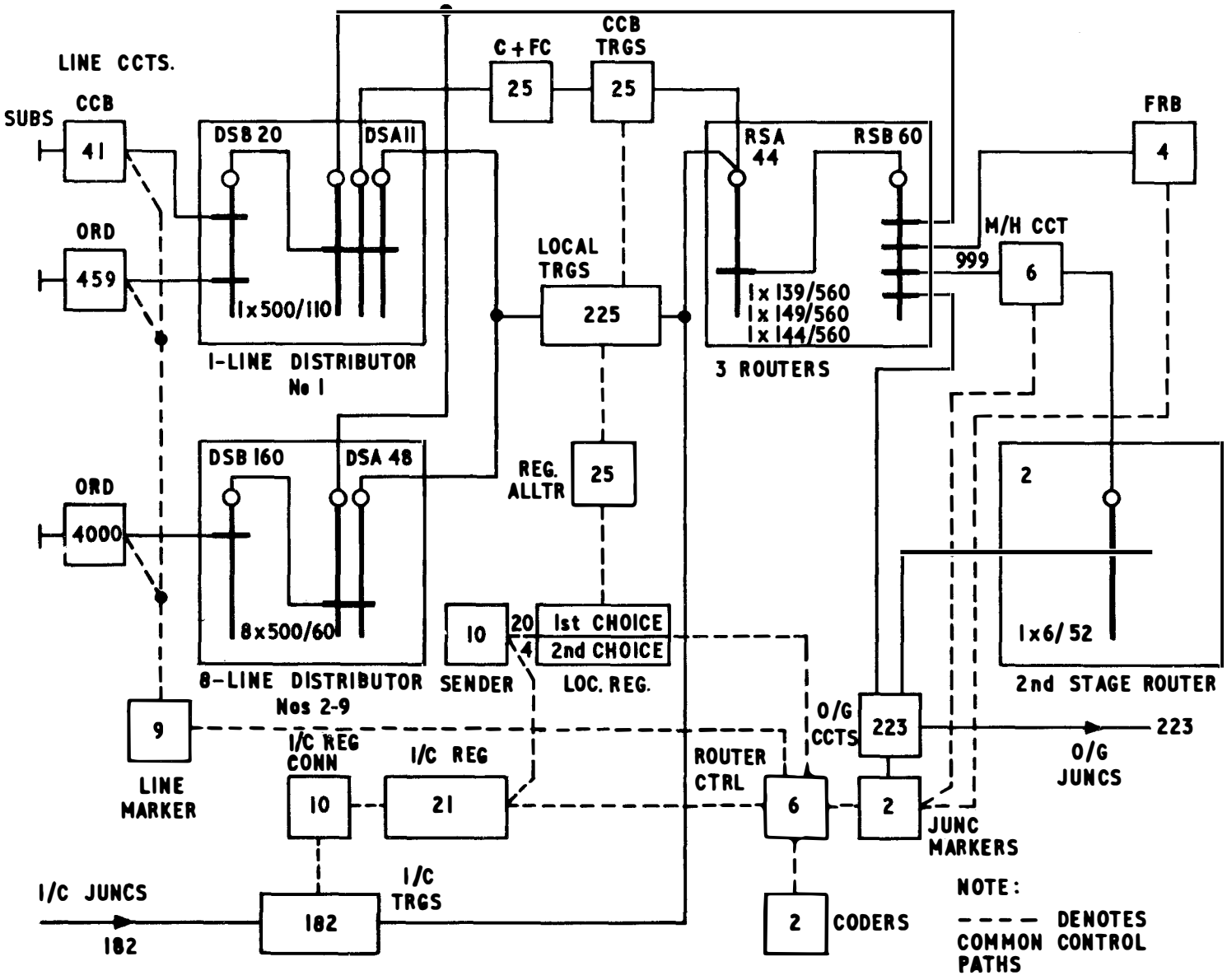
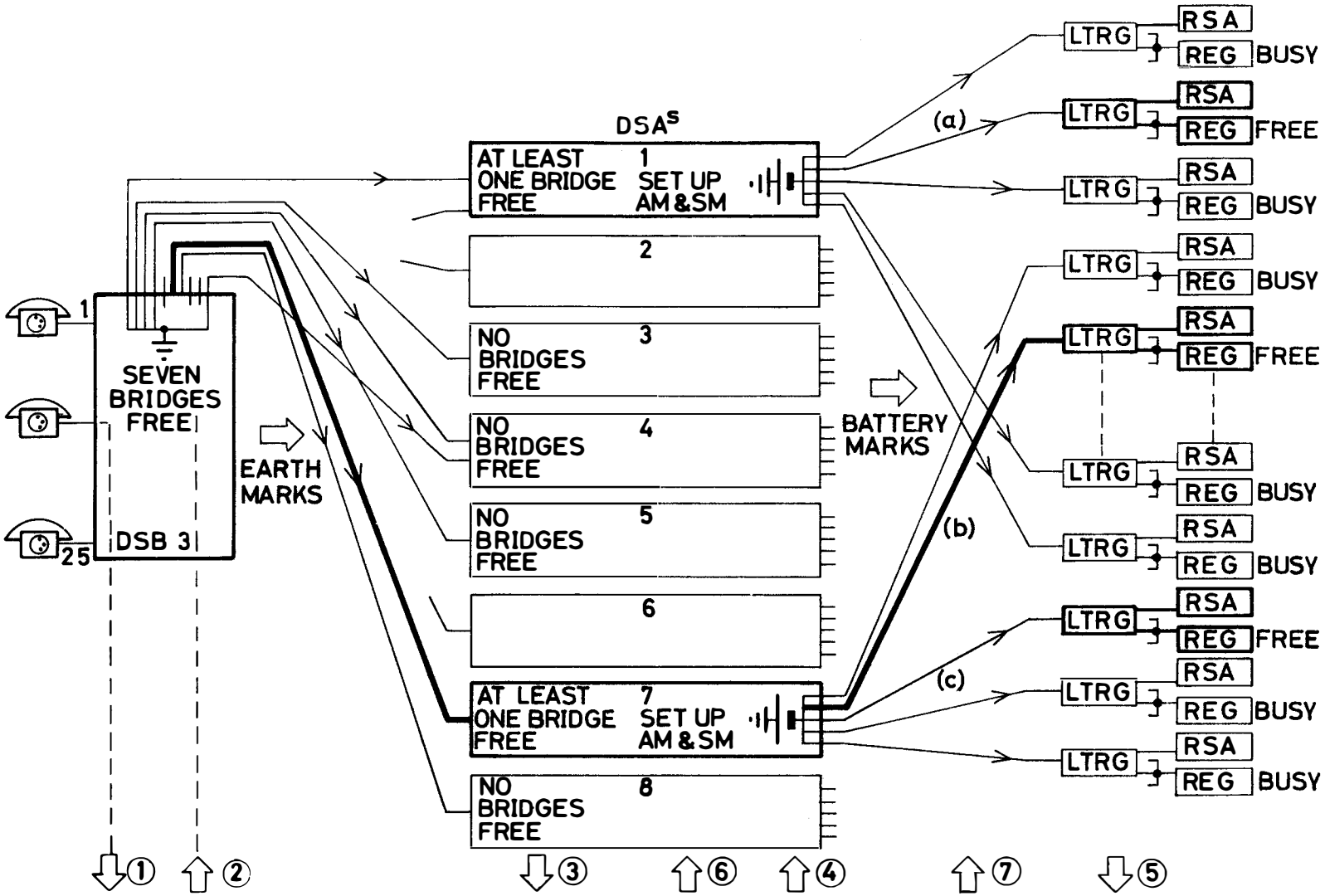


Fig. 5-1 Trunking of TXK1 Crossbar Exchange



R37161

Fig. 5-2 TXK1. An Outline of Path Selection to the Register

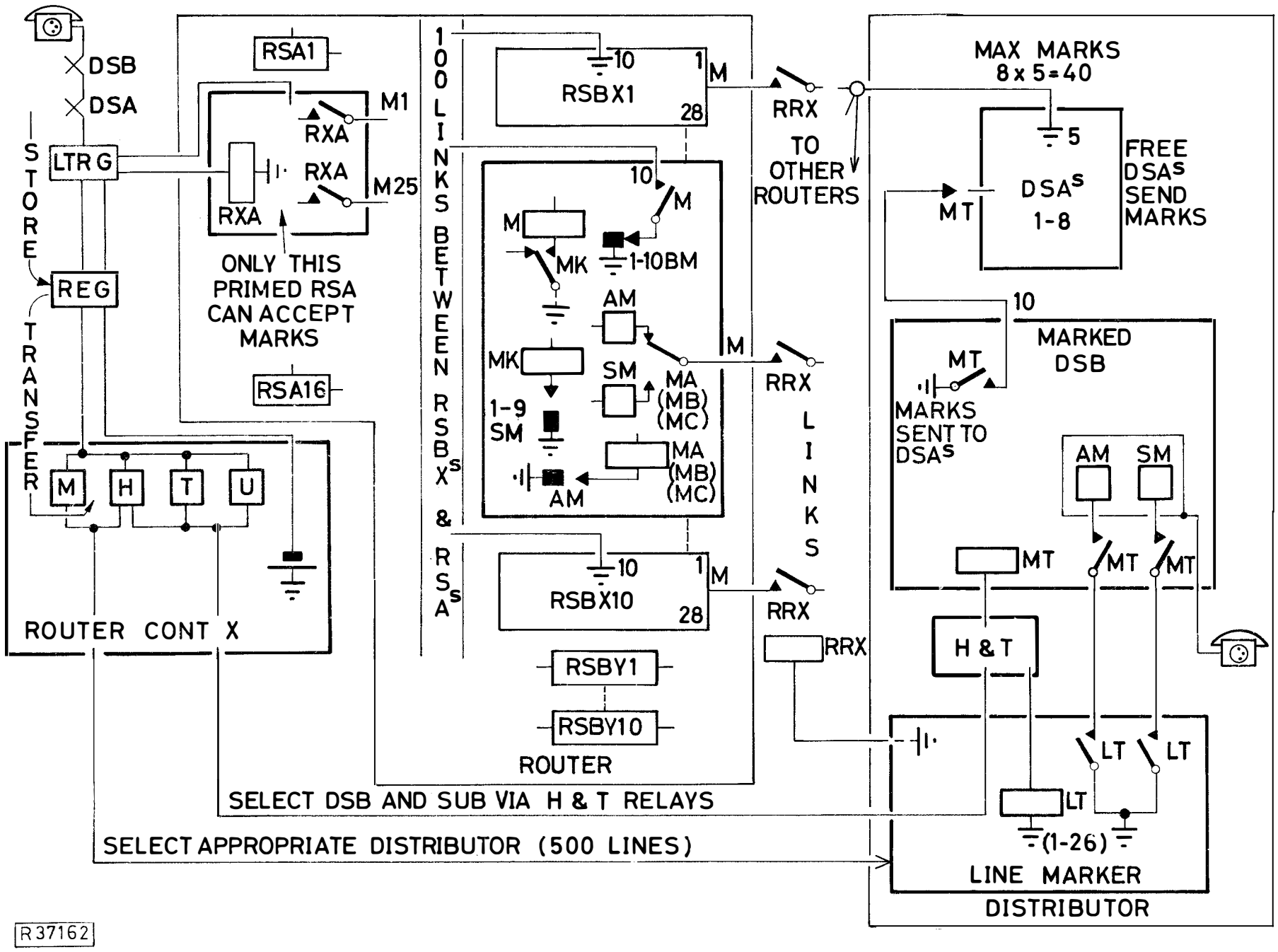


Fig. 5-3 TXK1. An Outline of Path Selection to the Called Subscriber

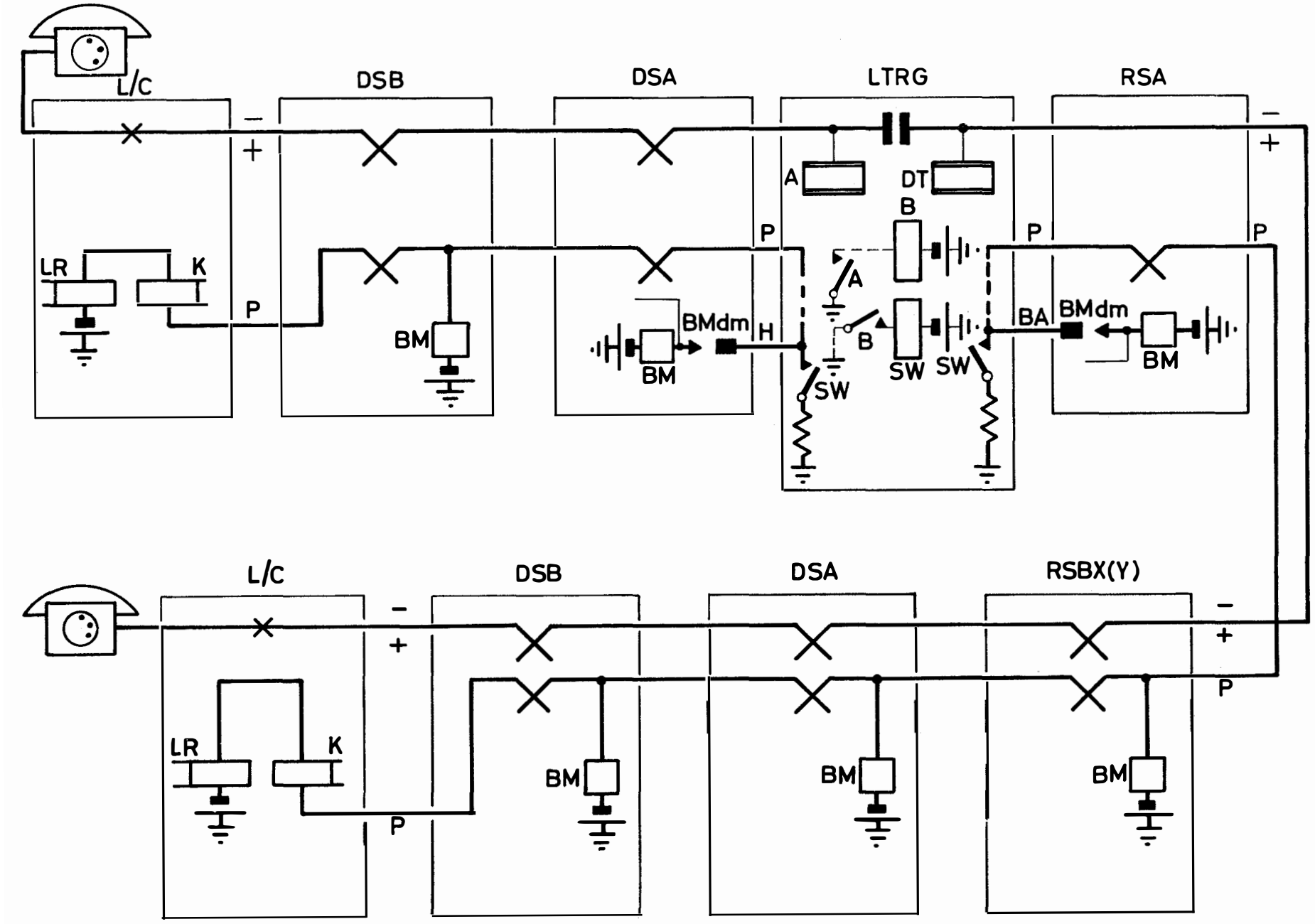


Fig. 5-4 TXK1. Holding the Selected Path

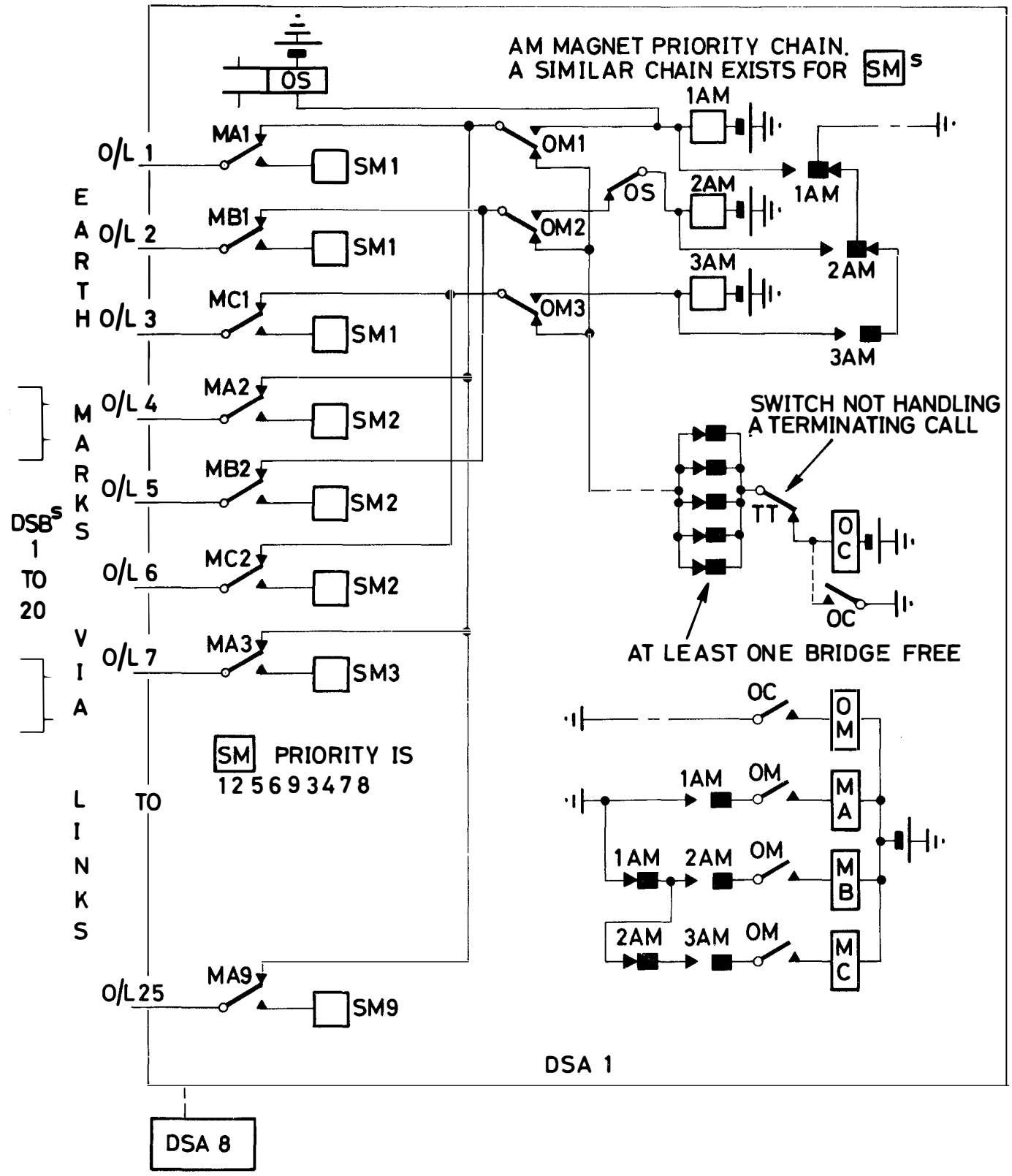


Fig. 5-5 TXK1. Outlet Access and Setting up an AM/SM Combination

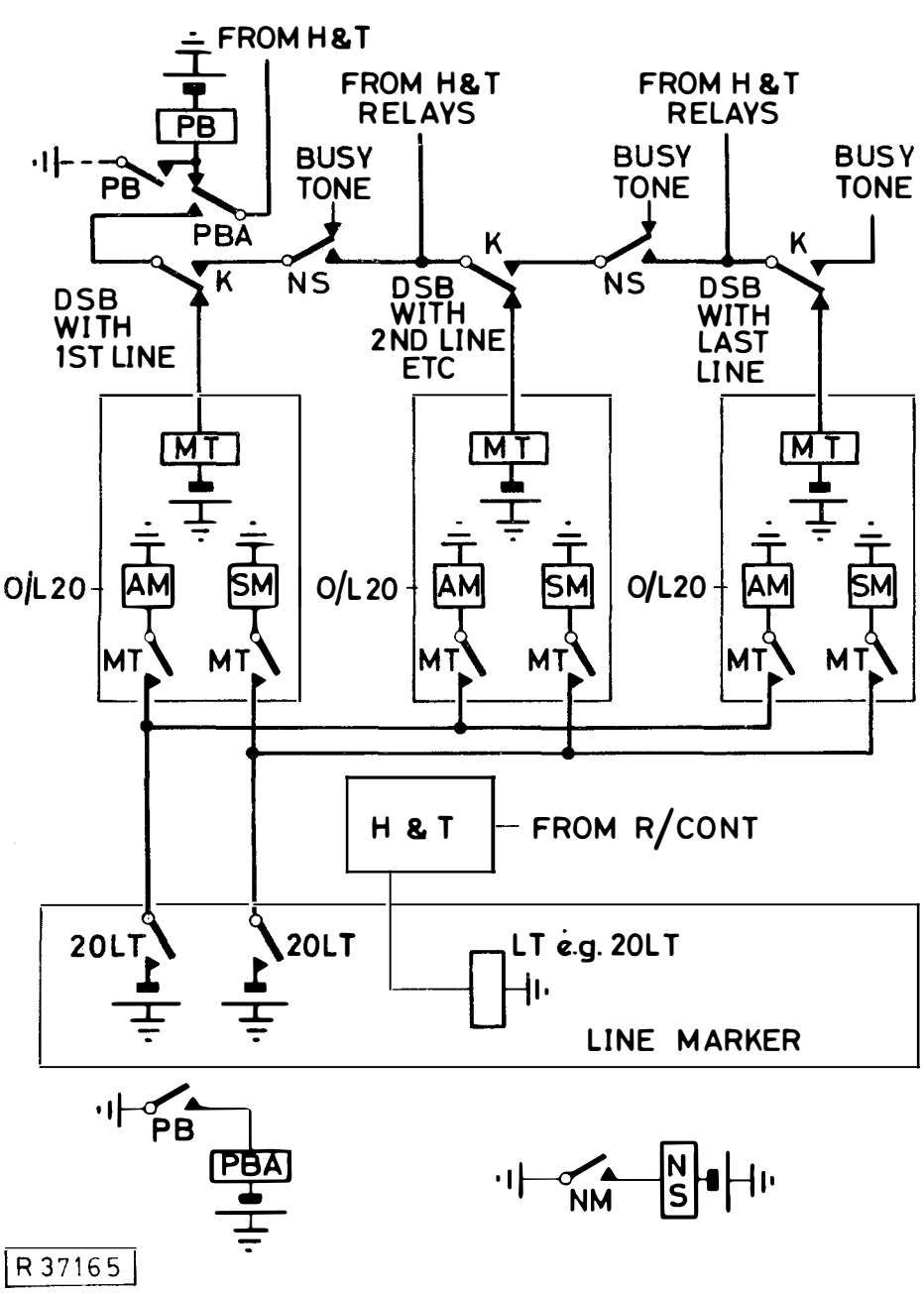


Fig. 5-6 TXK1. 2-20 PBX Working

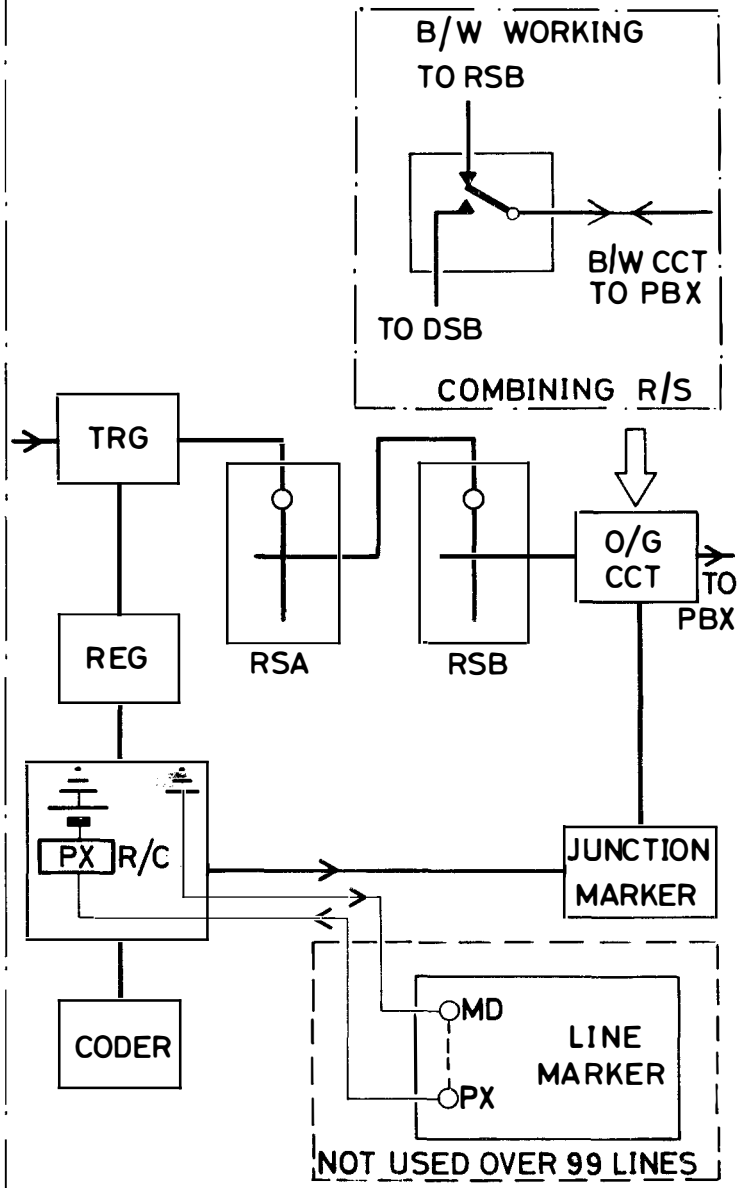


Fig. 5-7 TXK1. 21/- PBX Working

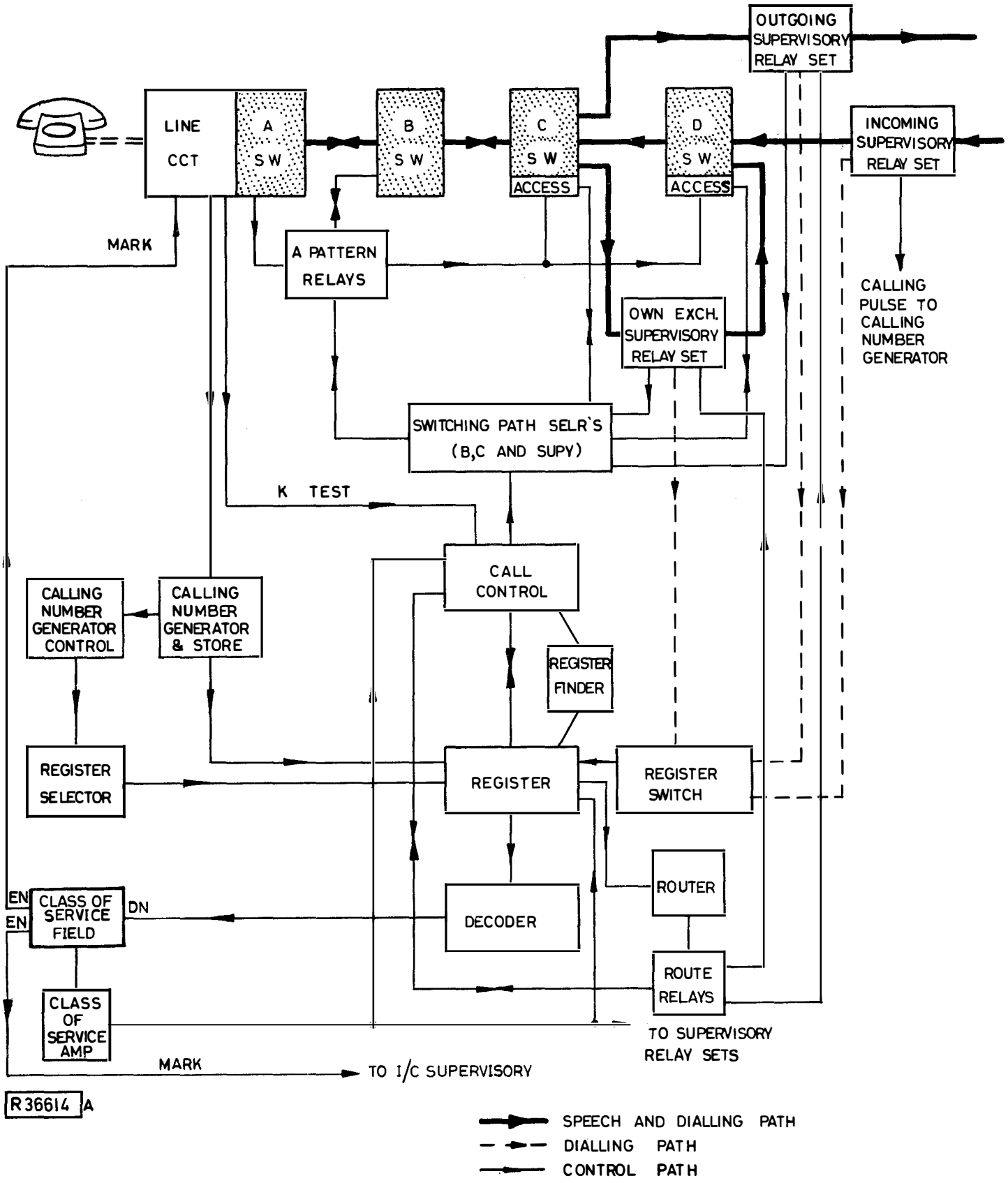


Fig. 6-1 TXE2. Setting up a Call

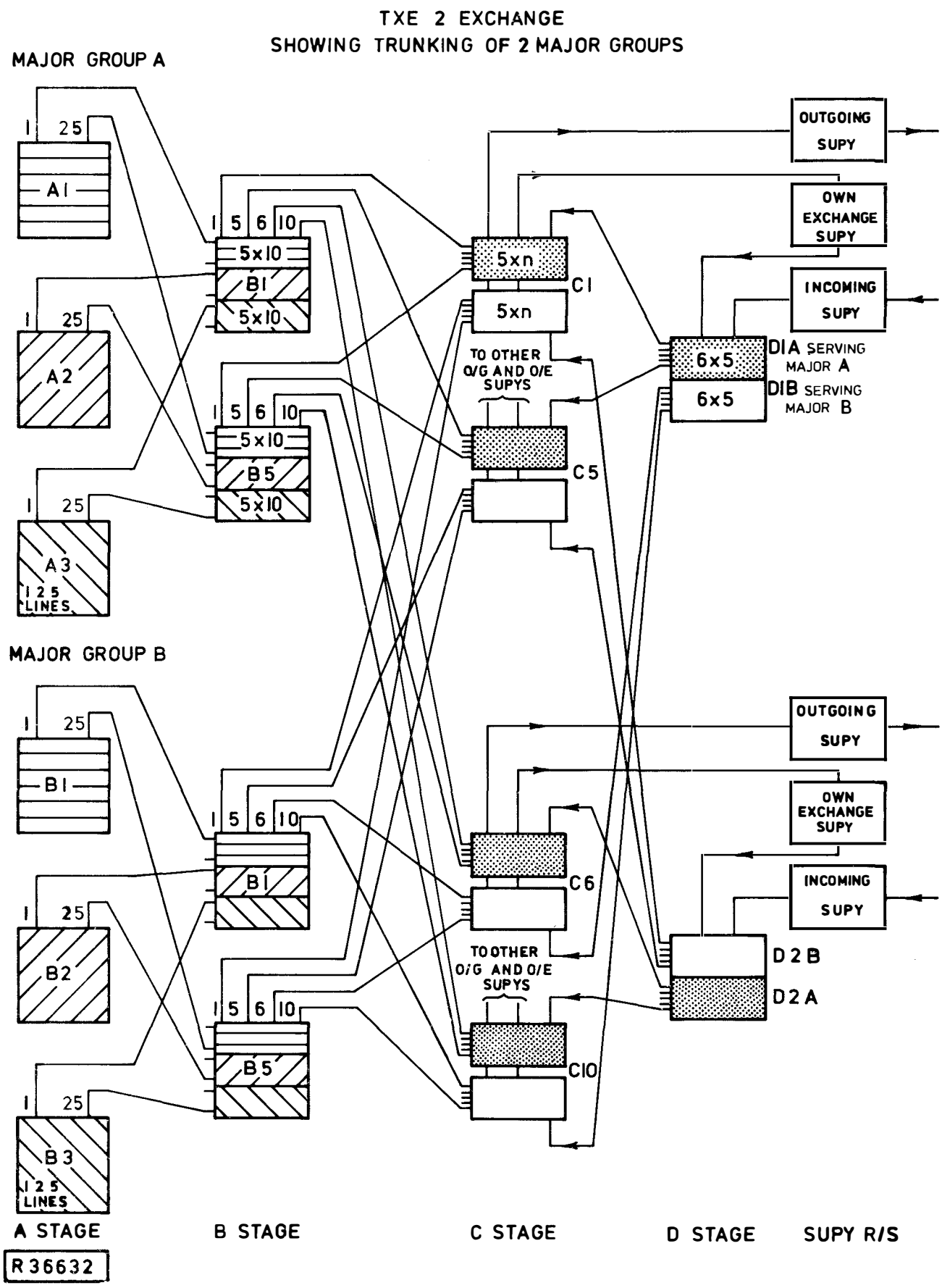


Fig. 6-2 TXE2. Trunking

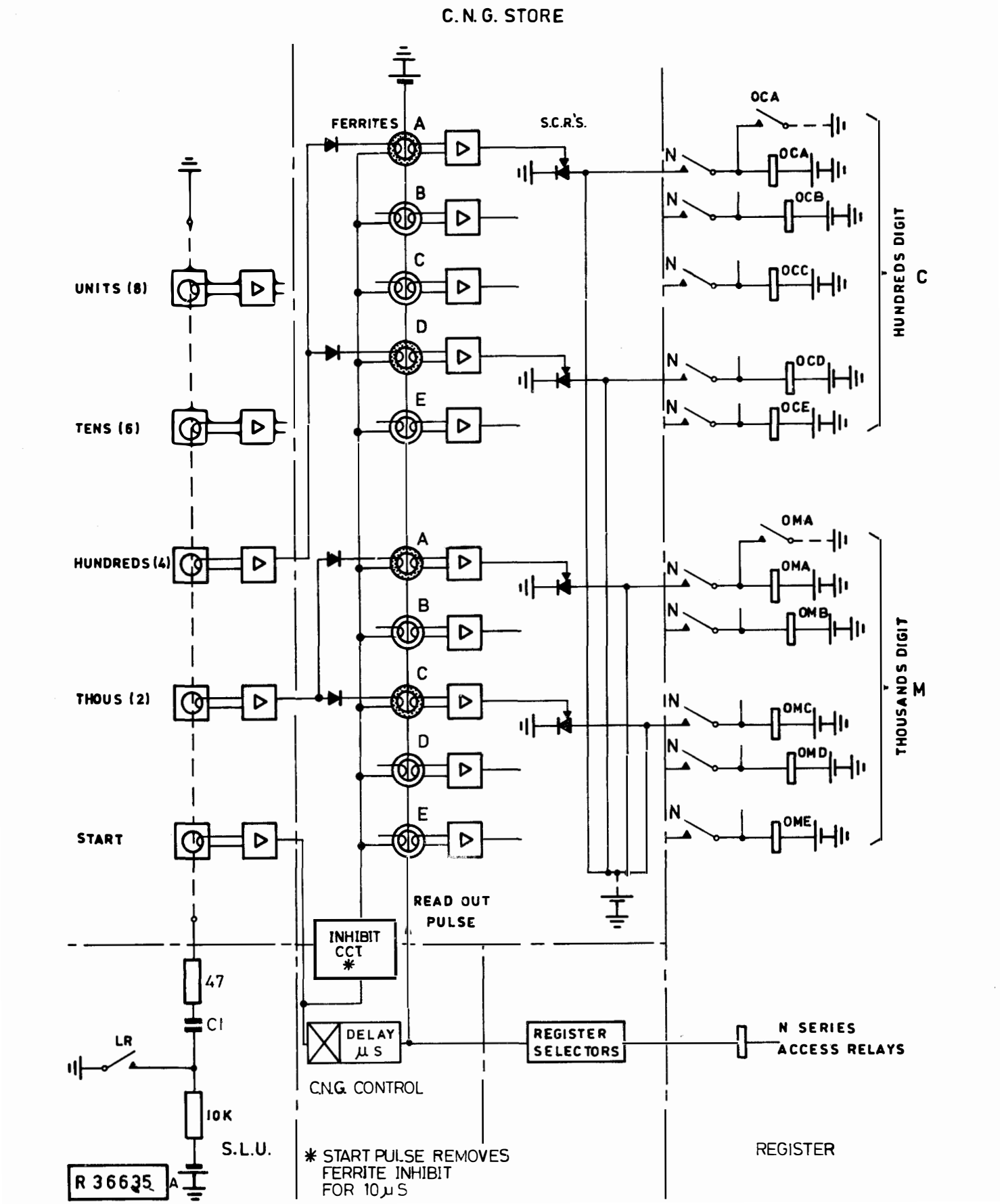


Fig. 6-3 TXE2. Calling Number Generator

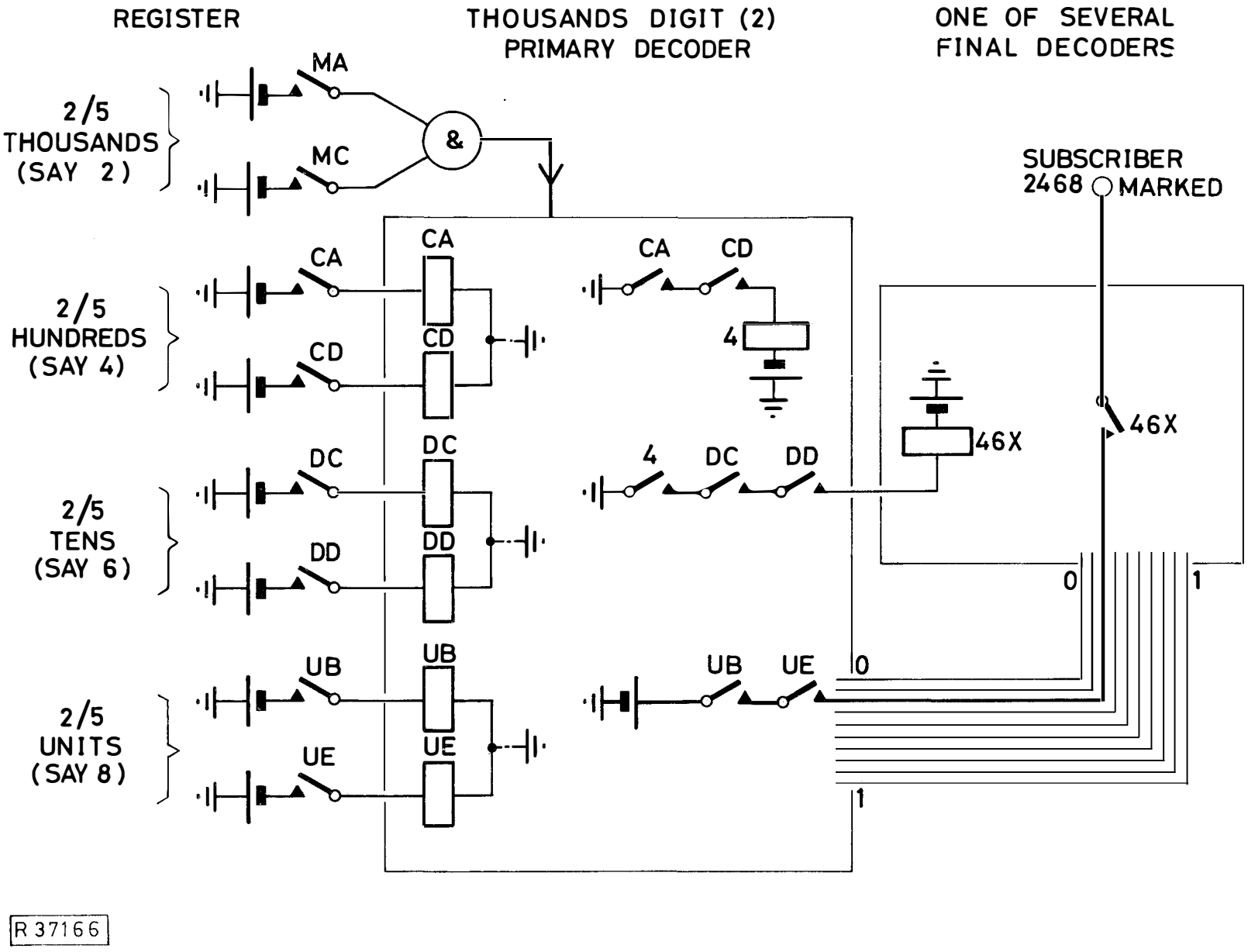


Fig. 6-4 TXE2. Decoder

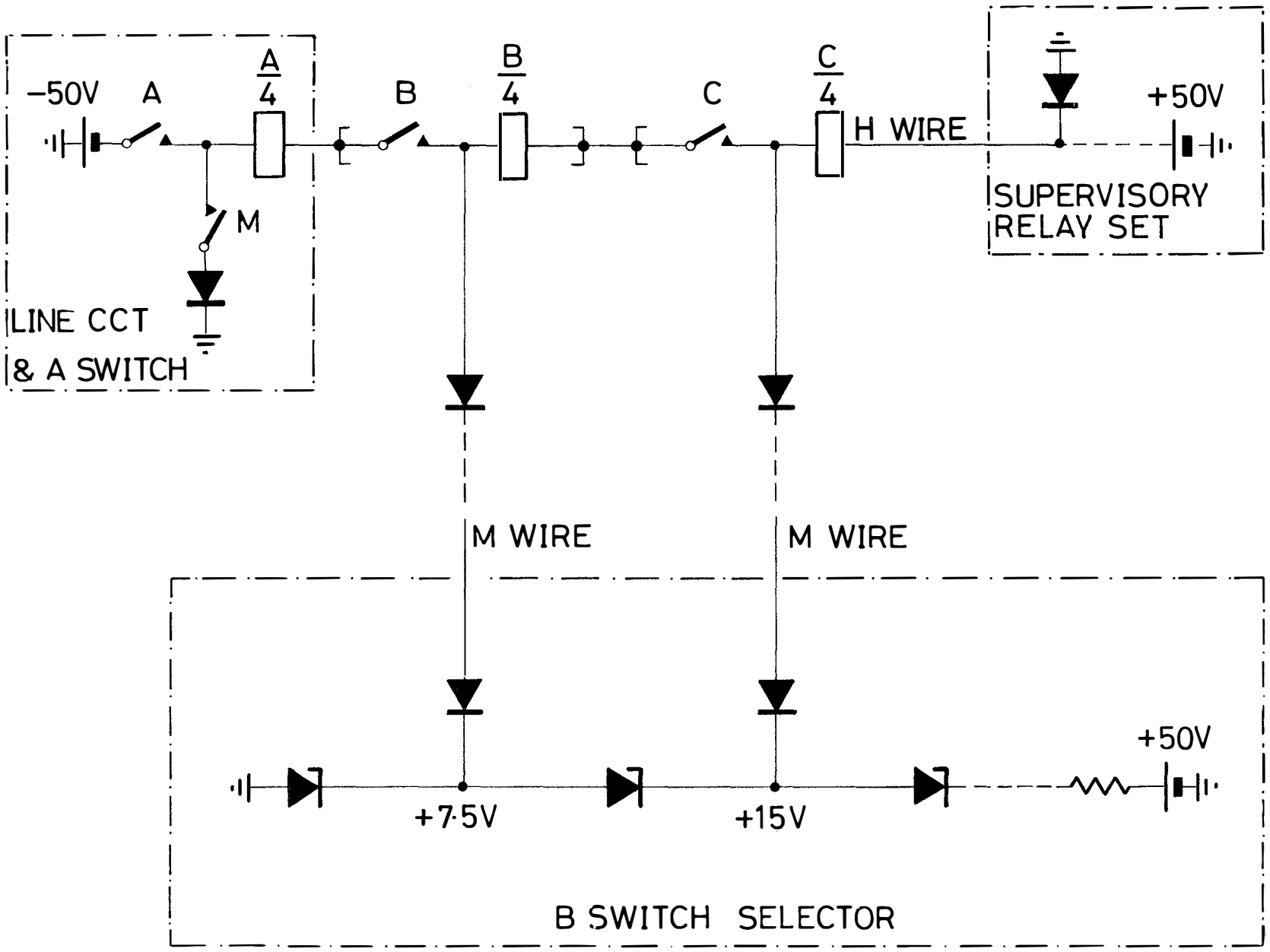


Fig. 6-5 TXE2. Method of Marking

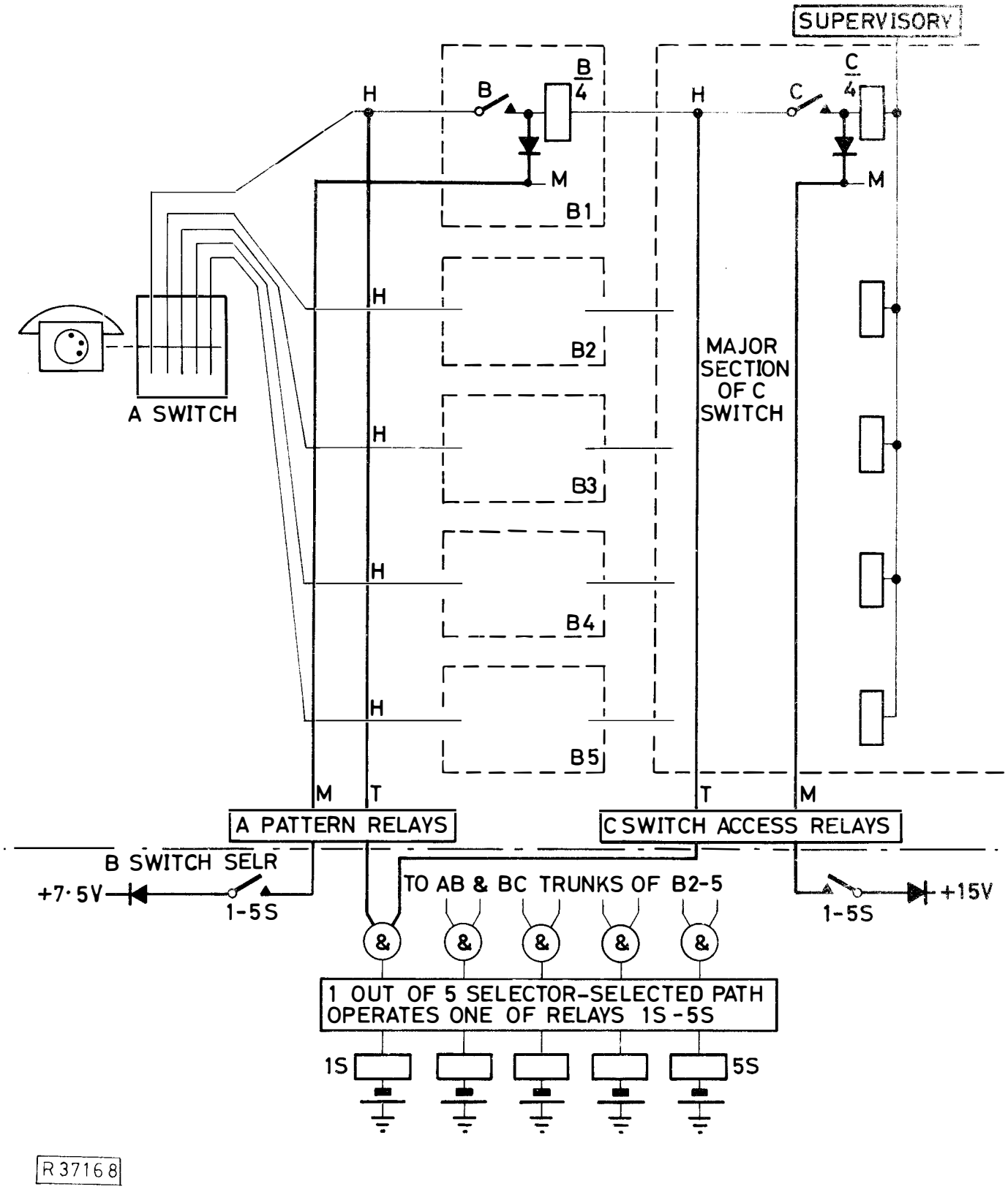


Fig. 6-6 TXE2. Path Selection

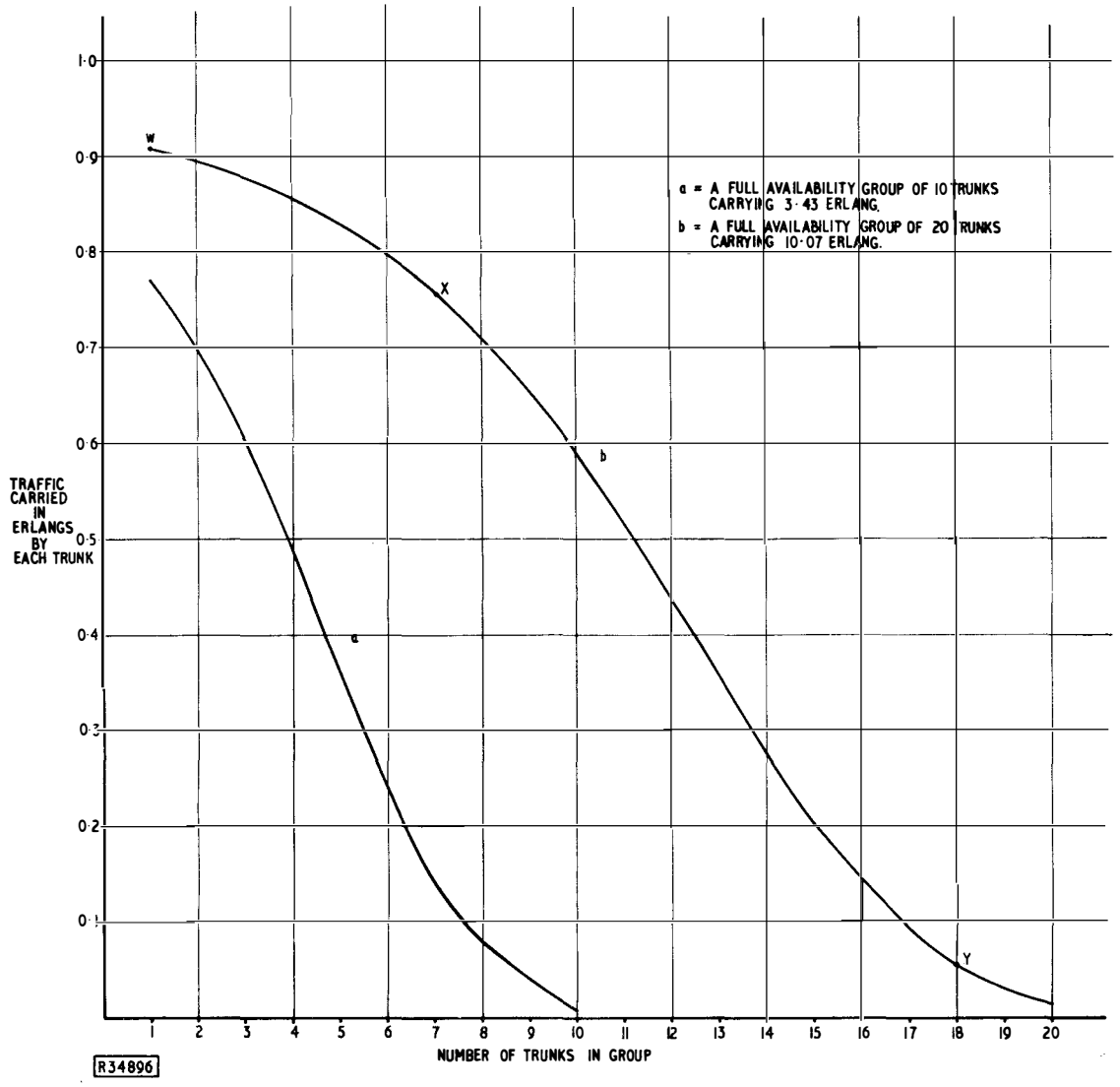
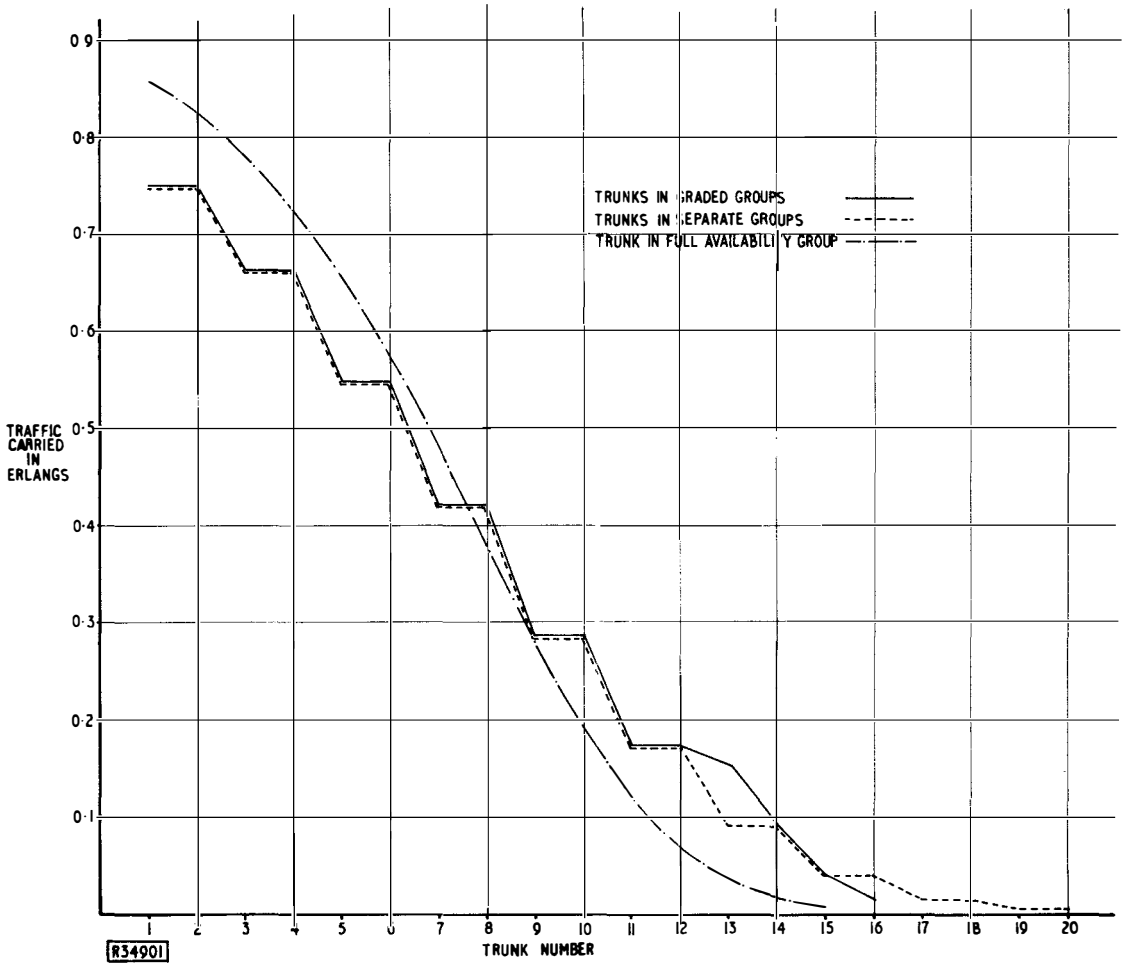


Fig. 7-1 Graph showing the greater efficiency of a 20 Trunk Full Availability group over a 10 Trunk group.



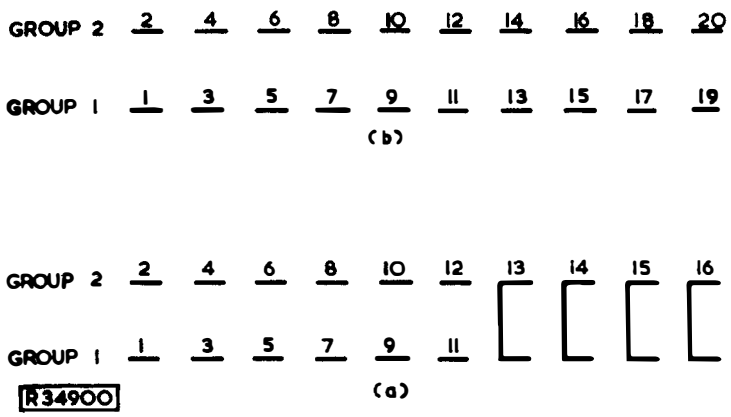


Fig. 7-2 Comparison of traffic carrying capacity for the arrangements shown and for full availability

TRAFFIC CAPACITY TABLE A.

FULL AVAILABILITY.

No. of Trunks.	Capacity in T.U. for Grade of Service of :—			No. of Trunks.	Capacity in T.U. for Grade of Service of :—		
	·005.	Standard.	·001.		·005.	Standard.	·001.
1	0·005	0·002	0·001	51	36·8	34·7	33·4
2	0·105	0·065	0·046	52	37·6	35·6	34·2
3	0·35	0·25	0·19	53	38·5	36·4	35·0
4	0·70	0·53	0·43	54	39·4	37·2	35·8
5	1·13	0·90	0·76	55	40·3	38·1	36·7
6	1·62	1·32	1·14	56	41·2	38·9	37·5
7	2·16	1·80	1·58	57	42·1	39·8	38·3
8	2·73	2·31	2·05	58	43·0	40·7	39·1
9	3·33	2·85	2·56	59	43·9	41·5	40·0
10	3·96	3·43	3·09	60	44·7	42·4	40·8
11	4·61	4·02	3·65	61	45·6	43·3	41·6
12	5·28	4·63	4·23	62	46·5	44·1	42·5
13	5·97	5·27	4·83	63	47·4	45·0	43·3
14	6·63	5·92	5·44	64	48·3	45·8	44·1
15	7·38	6·58	6·08	65	49·2	46·7	45·0
16	8·10	7·26	6·72	66	50·1	47·6	45·8
17	8·84	7·95	7·38	67	51·0	48·4	46·6
18	9·58	8·64	8·04	68	51·9	49·3	47·5
19	10·34	9·35	8·72	69	52·8	50·1	48·3
20	11·10	10·07	9·41	70	53·7	51·0	49·2
21	11·87	10·80	10·11	71	54·6	51·9	50·1
22	12·64	11·53	10·81	72	55·5	52·7	50·9
23	13·42	12·27	11·52	73	56·4	53·6	51·8
24	14·21	13·01	12·24	74	57·3	54·4	52·6
25	15·0	13·76	13·0	75	58·2	55·2	53·5
26	15·8	14·5	13·7	76	59·1	56·1	54·3
27	16·6	15·3	14·4	77	60·0	56·9	55·2
28	17·4	16·1	15·2	78	60·9	57·8	56·1
29	18·2	16·9	15·9	79	61·8	58·6	56·9
30	19·0	17·7	16·7	80	62·7	59·4	57·8
31	19·8	18·4	17·4	81	63·6	60·3	58·6
32	20·6	19·2	18·2	82	64·5	61·1	59·5
33	21·4	20·0	18·9	83	65·4	62·0	60·4
34	22·3	20·8	19·7	84	66·3	62·8	61·3
35	23·1	21·6	20·5	85	67·2	63·7	62·1
36	23·9	22·4	21·3	86	68·1	64·5	63·0
37	24·8	23·2	22·1	87	69·0	65·4	63·9
38	25·6	24·0	22·9	88	69·9	66·2	64·8
39	26·5	24·9	23·7	89	70·8	67·0	65·6
40	27·3	25·7	24·5	90	71·8	67·9	66·5
41	28·2	26·5	25·3	91	72·7	68·7	67·4
42	29·0	27·3	26·1	92	73·6	69·6	68·3
43	29·9	28·1	26·9	93	74·5	70·4	69·1
44	30·8	28·9	27·7	94	75·4	71·3	70·0
45	31·6	29·7	28·5	95	76·3	72·1	70·9
46	32·5	30·5	29·3	96	77·2	73·0	71·8
47	33·3	31·4	30·1	97	78·2	73·8	72·6
48	34·2	32·2	30·9	98	79·1	74·7	73·5
49	35·1	33·0	31·7	99	80·0	75·6	74·4
50	35·9	33·9	32·5	100	80·9	76·4	75·3

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Fig. 7-3 Typical Traffic Table

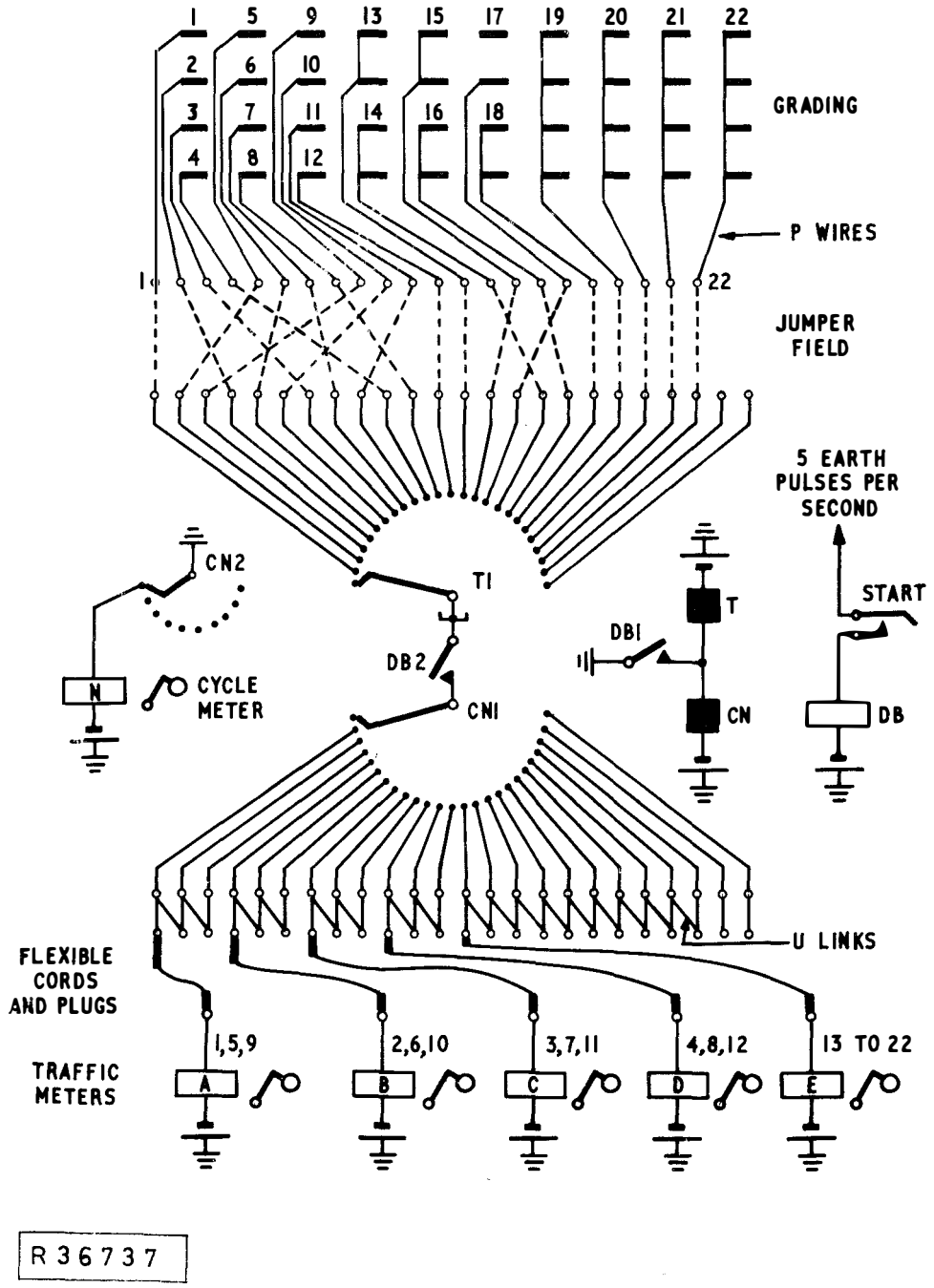


Fig. 7-4 Principle of Traffic Recording

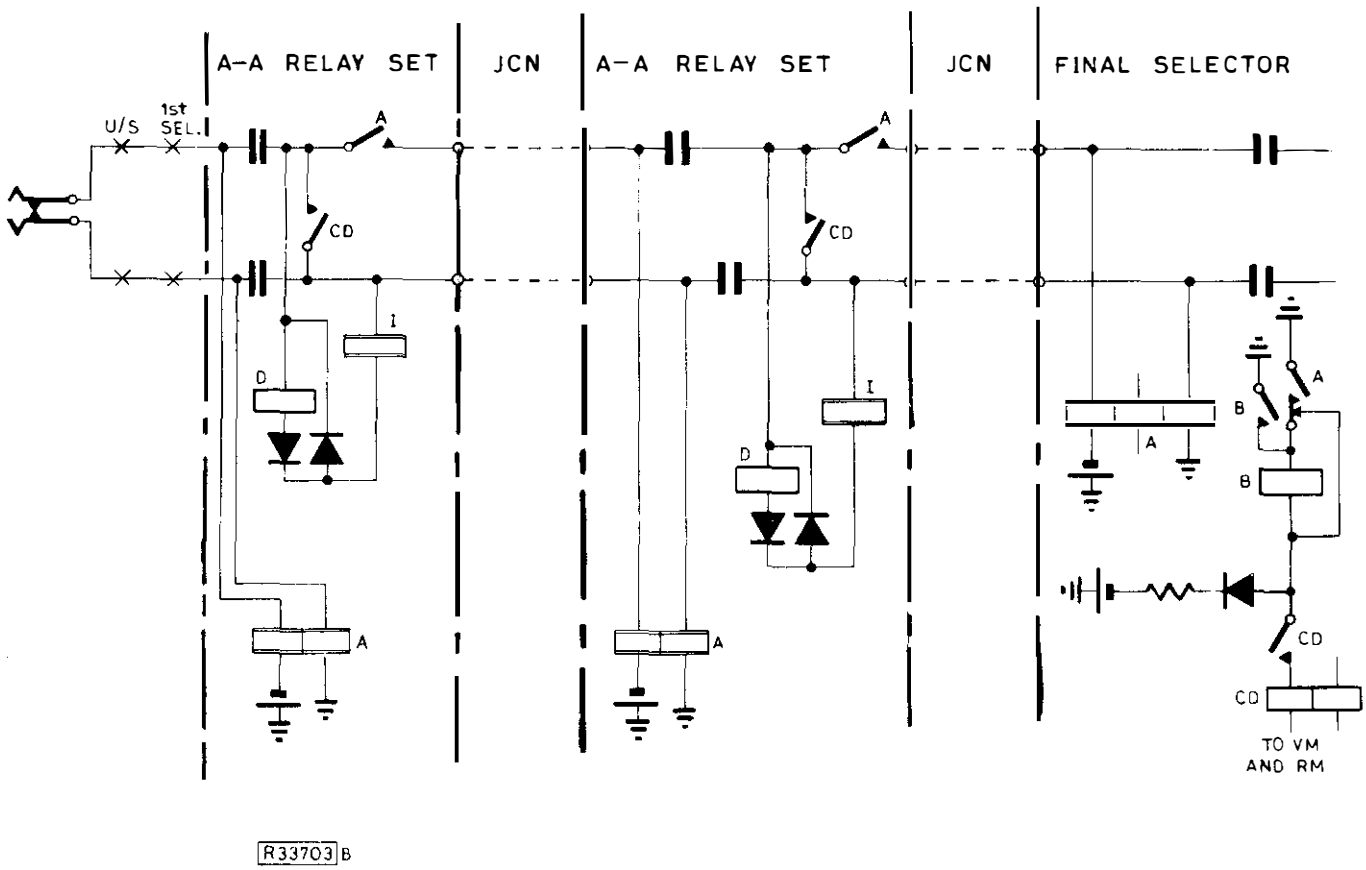


Fig. 8-1 Basic junction connexions for loop-disconnect pulsing

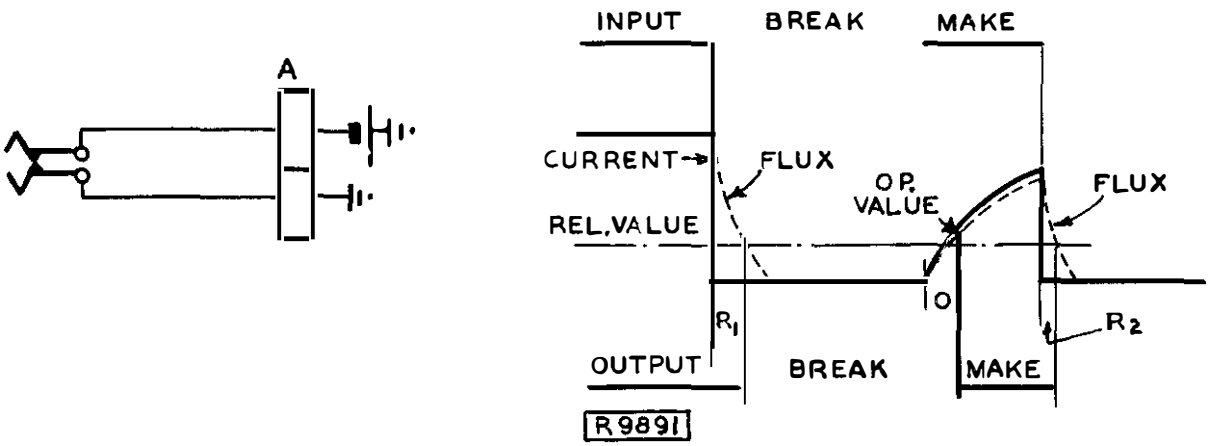
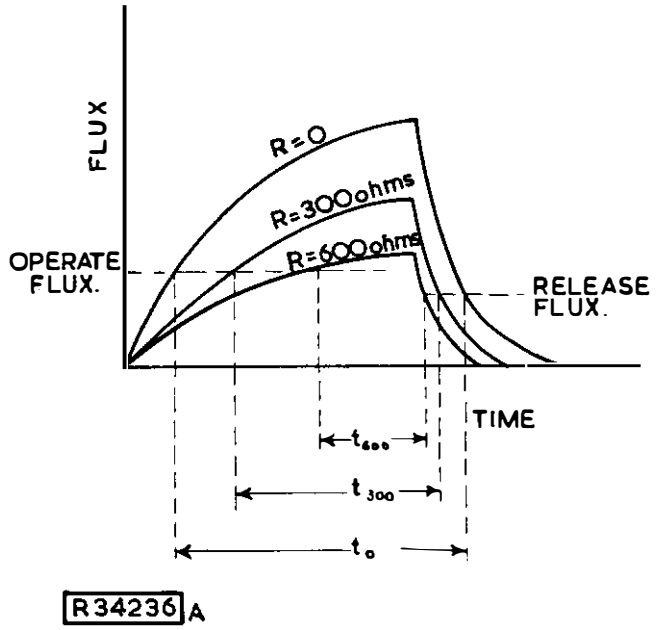


Fig. 8-2 Distortion produced by A Relay



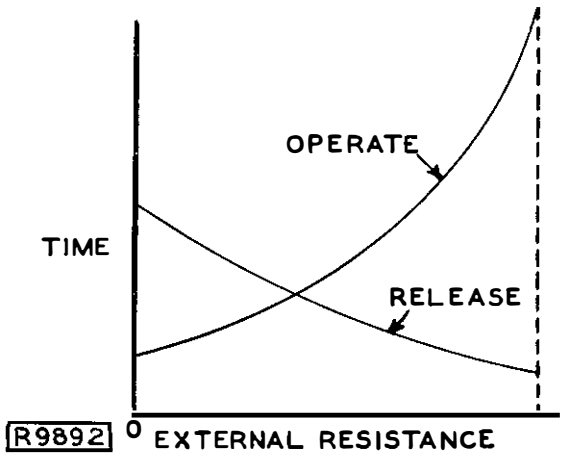


Fig. 8-3 Effect of line resistance on operate and release time of A relay (Loop-dis pulsing)

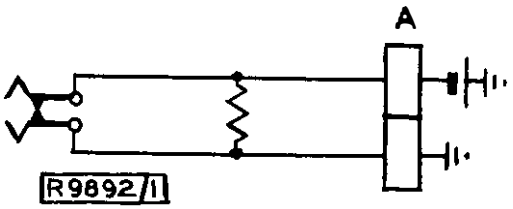
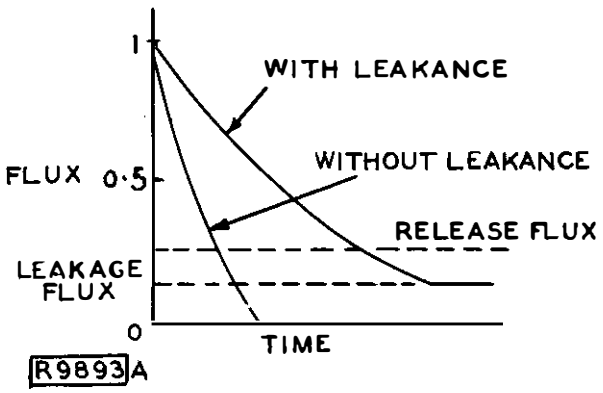
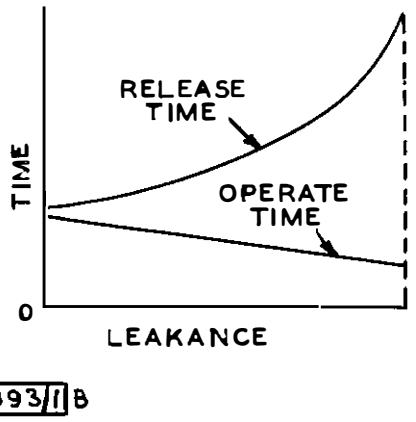


Fig. 8-4 Effect of leakance on A Relay operate and release times





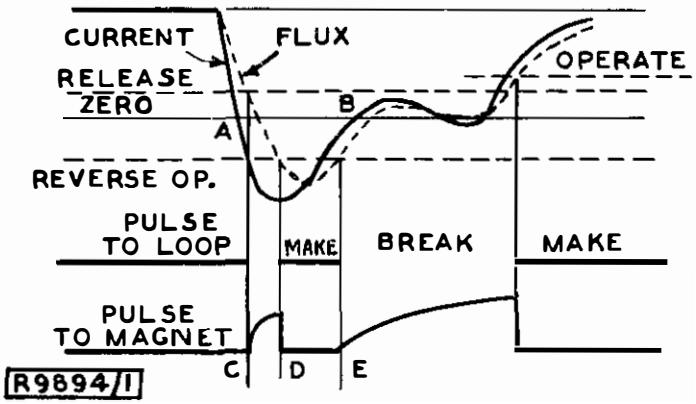


Fig. 8-5 Effect of Subscriber's telephone capacitors on A relay current

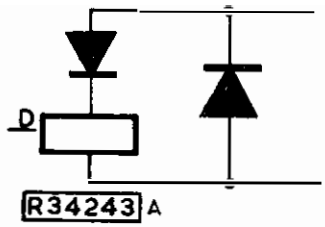


Fig. 8-6 Use of rectifier to eliminate inductance of D relay and improve the initial pick up condition

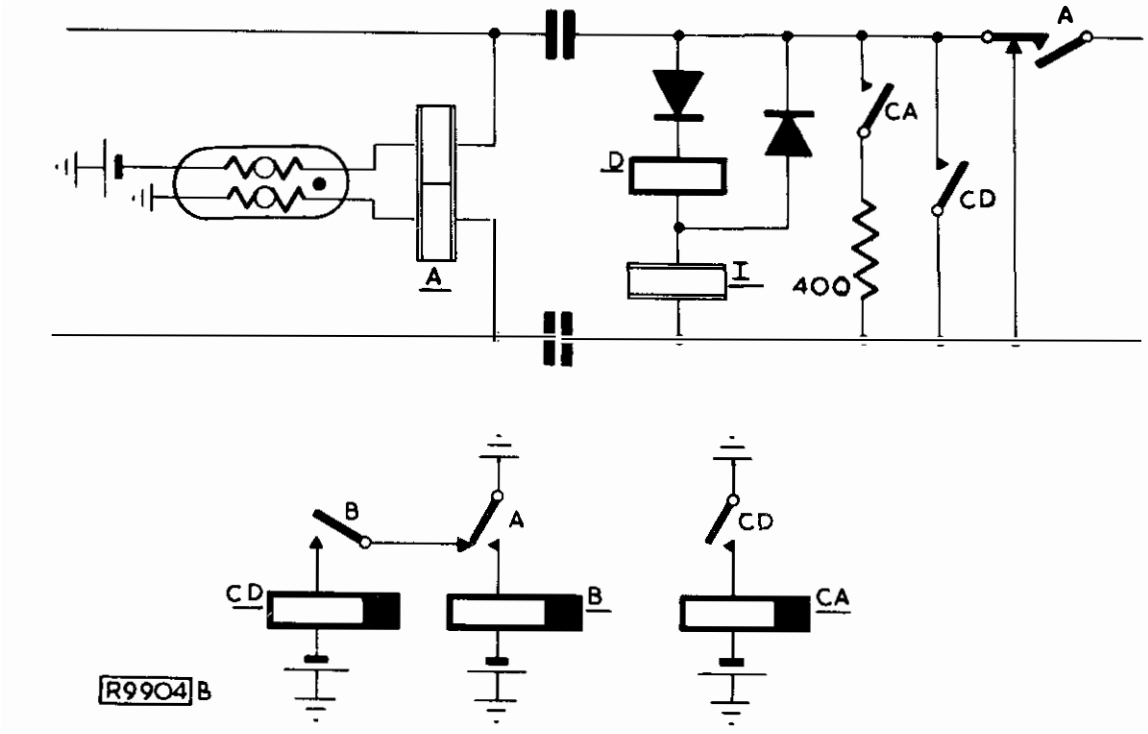


Fig. 8-7 Circuit element of Auto-Auto relay set used to improve performance under Subsequent Pick Up conditions

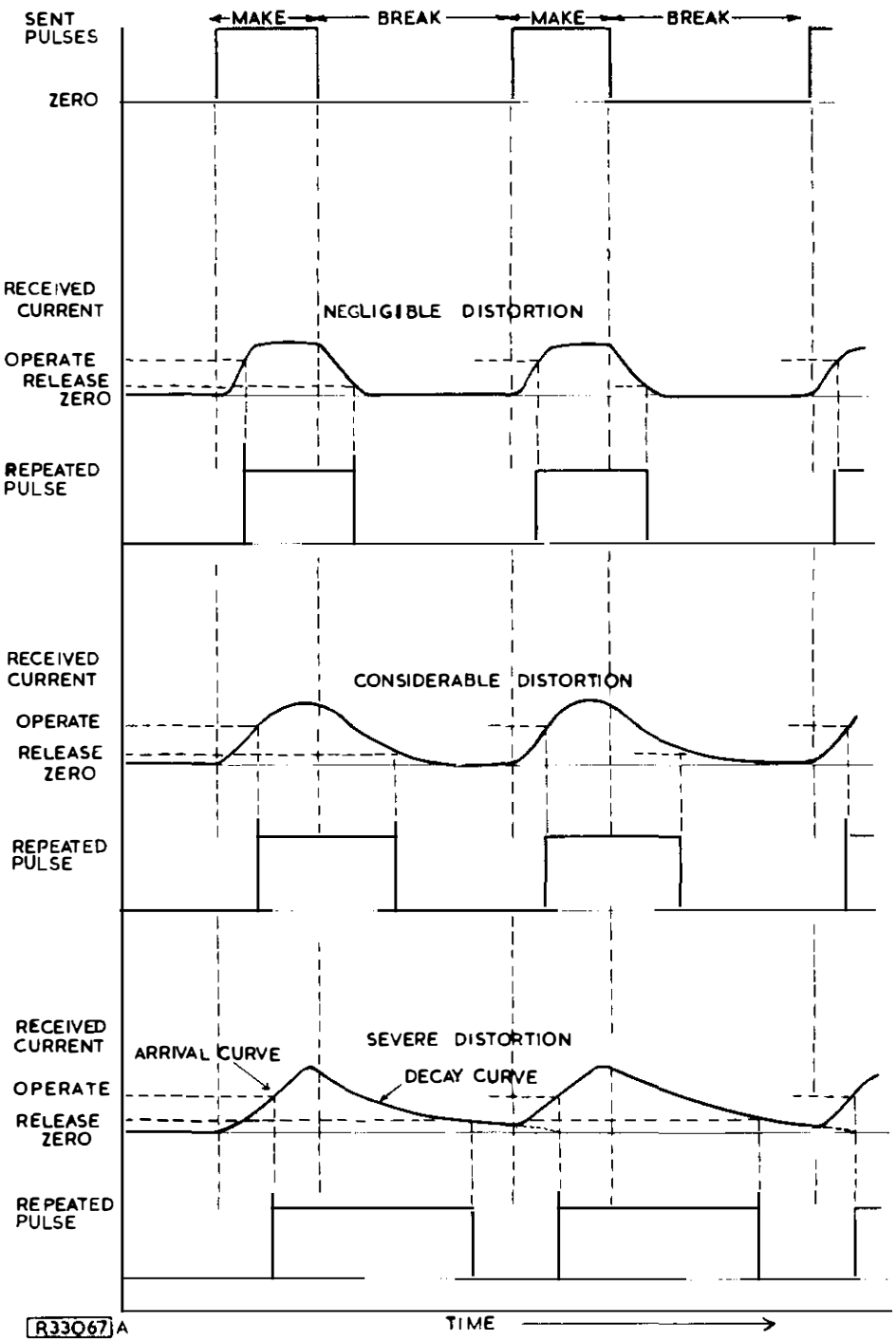


Fig. 8-8 Pulse Distortion in Long Distance Pulsing

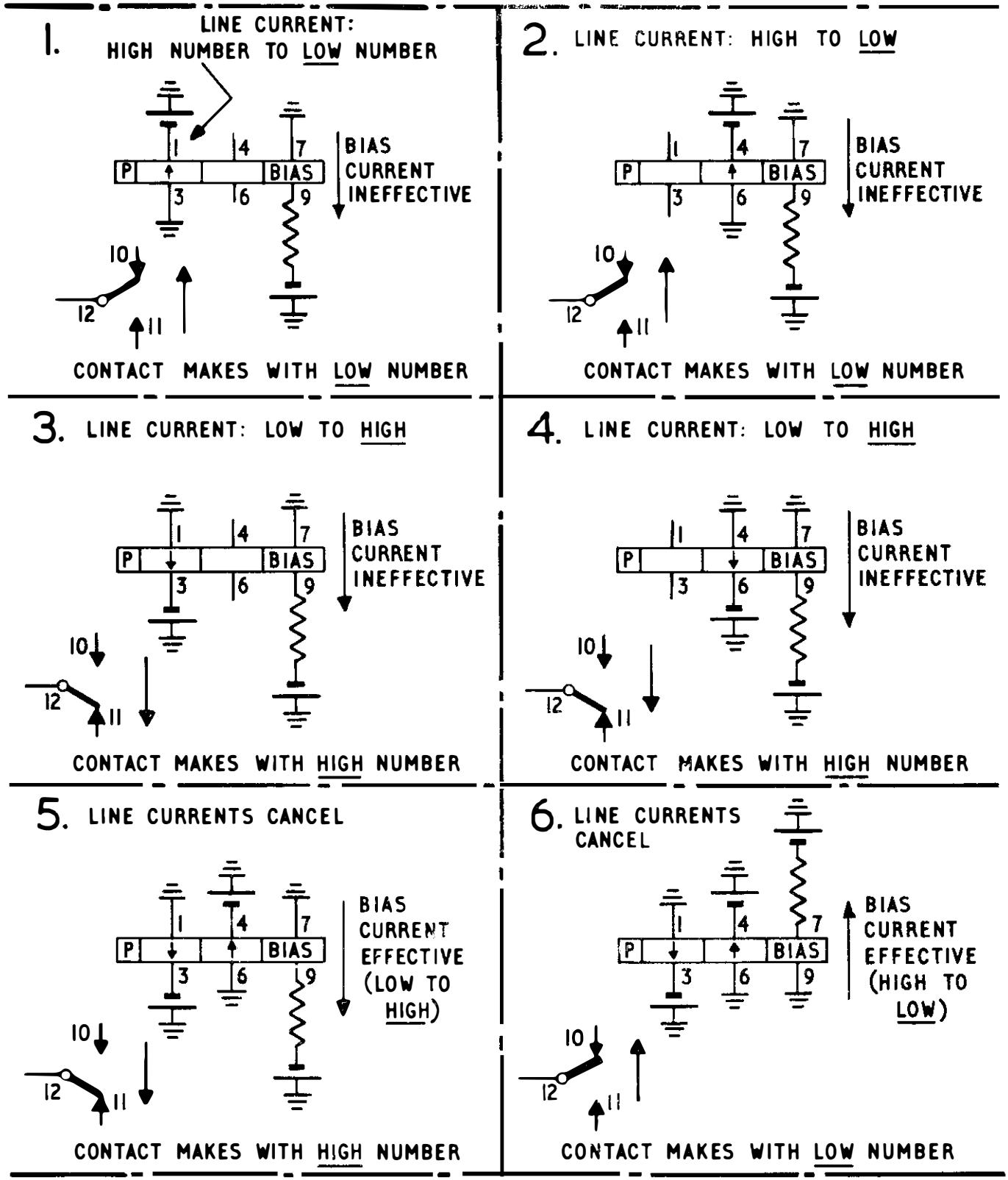


Fig. 8-9 Control of Carpenter Relay

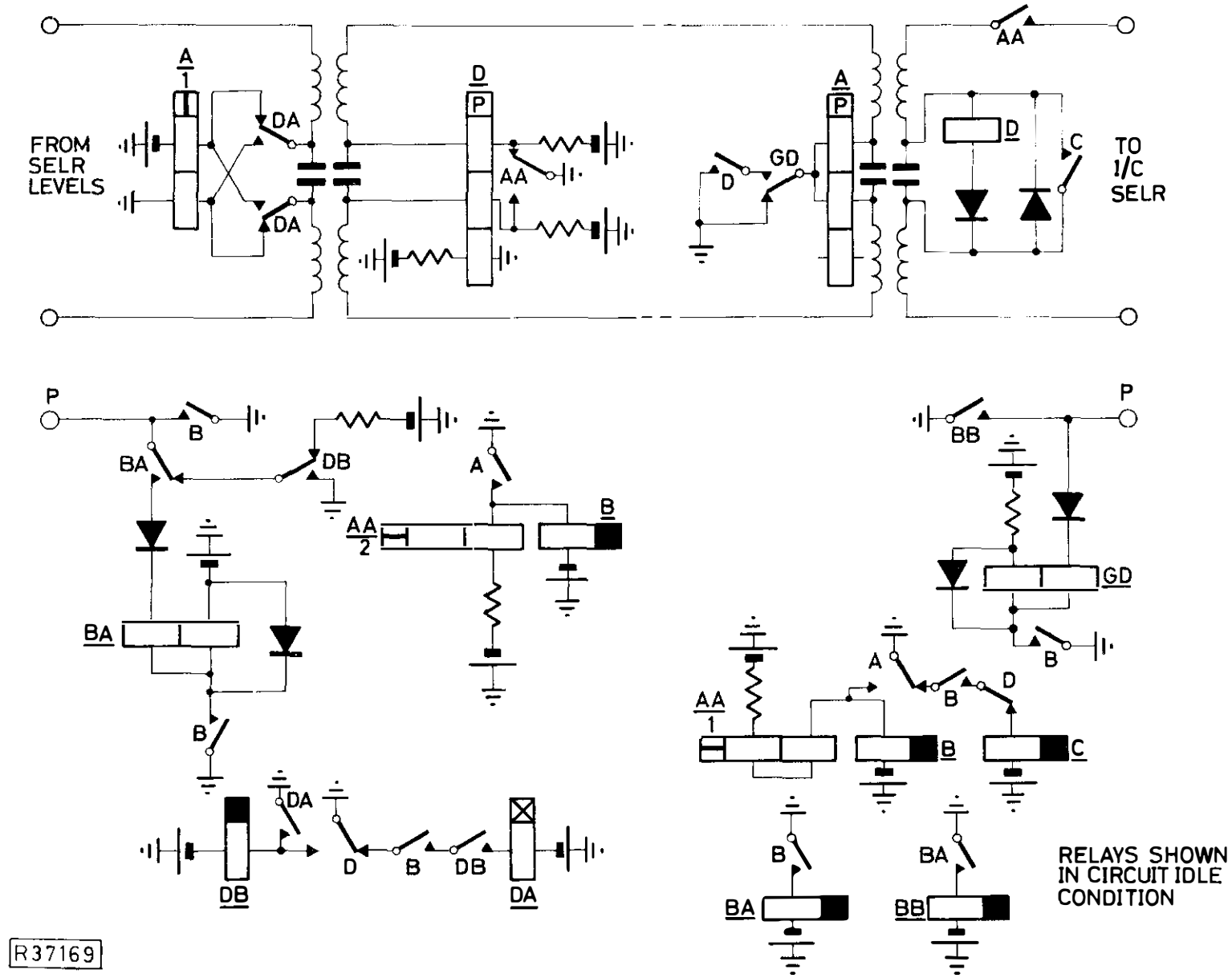


Fig. 8-10 DC2 Signalling Principles

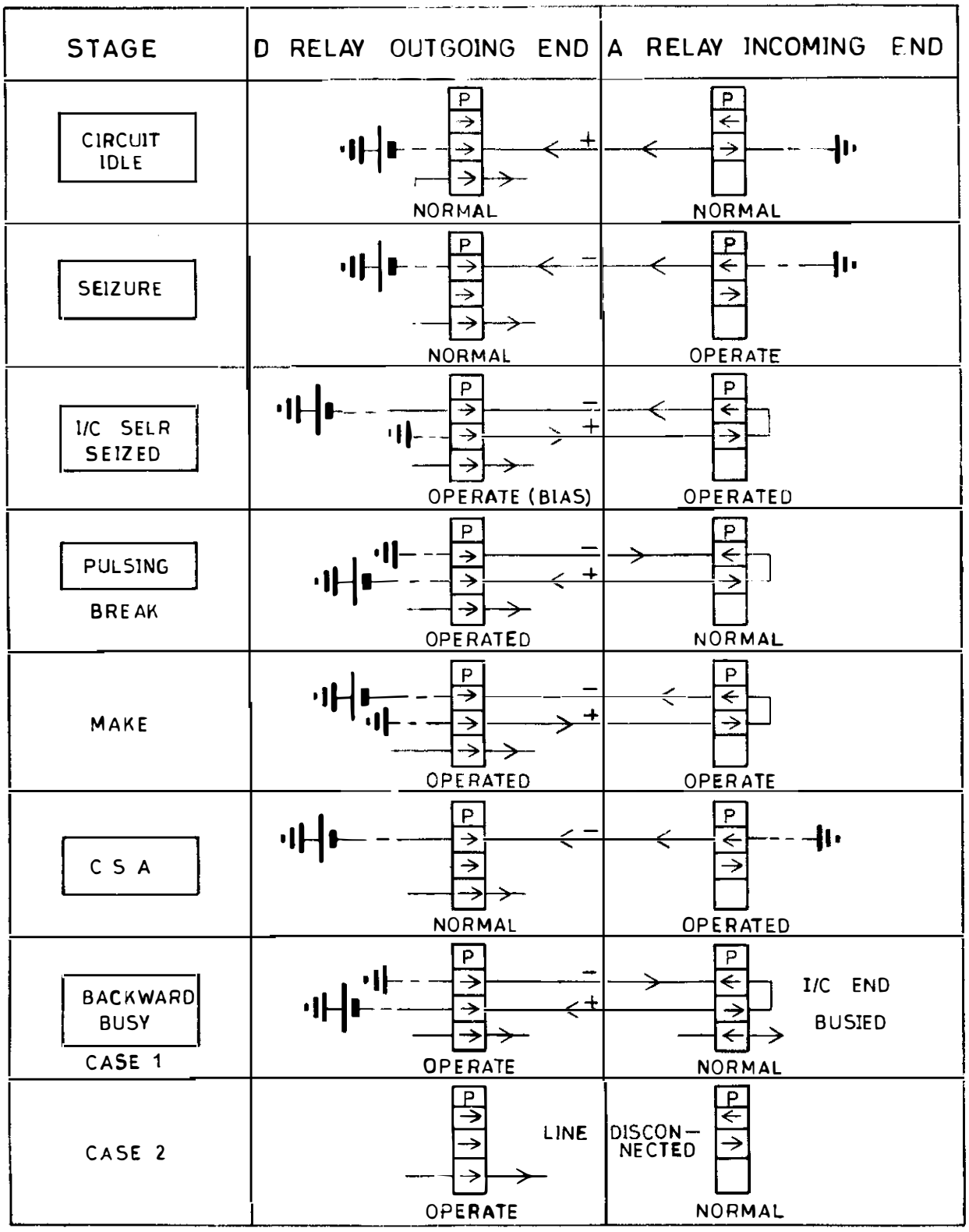


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Fig. 8-11 State of D and A Relays at various stages in a call

If current flows through any coil in the direction of an arrow, providing there is no countering effect from another winding, the relay will operate.

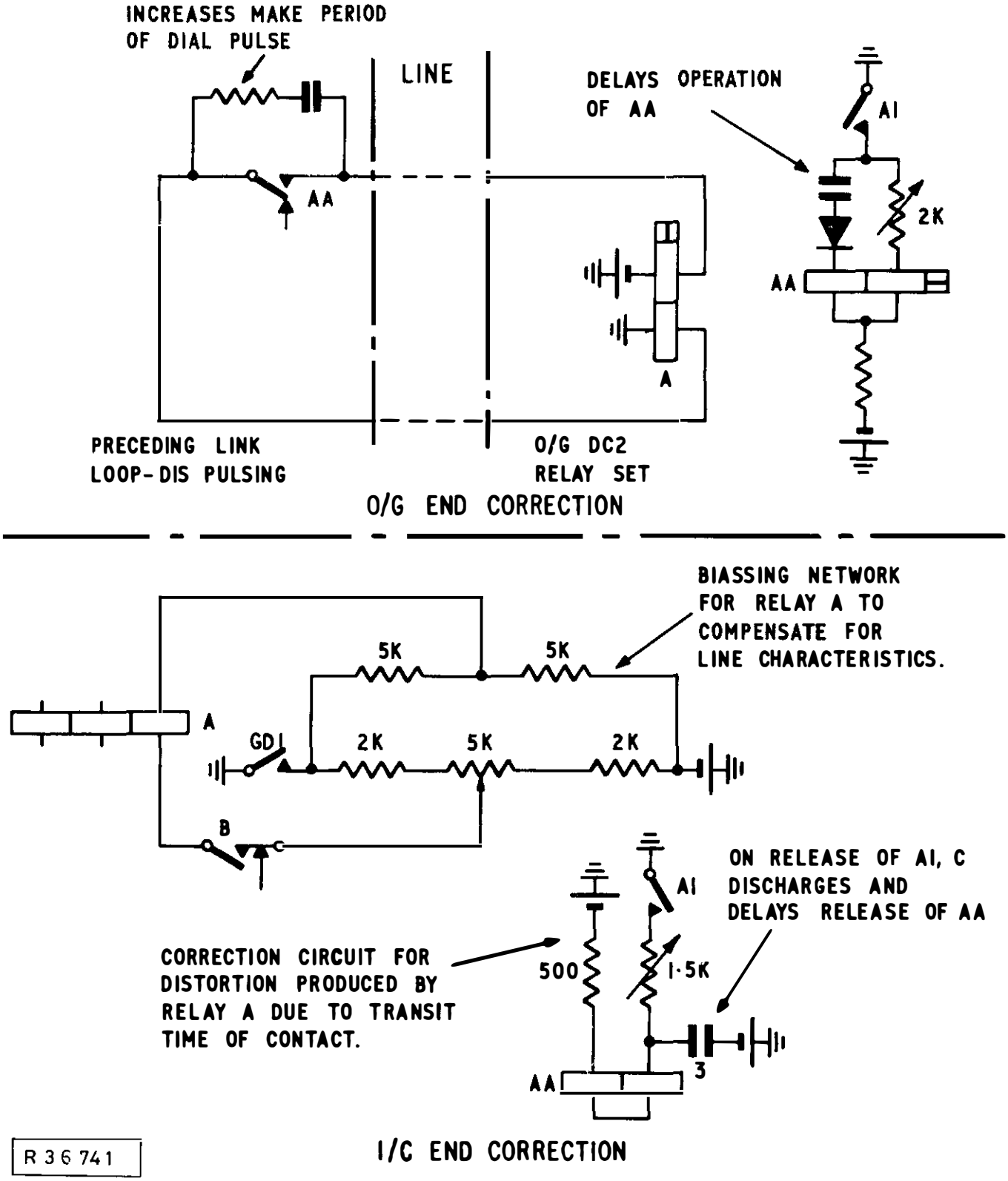
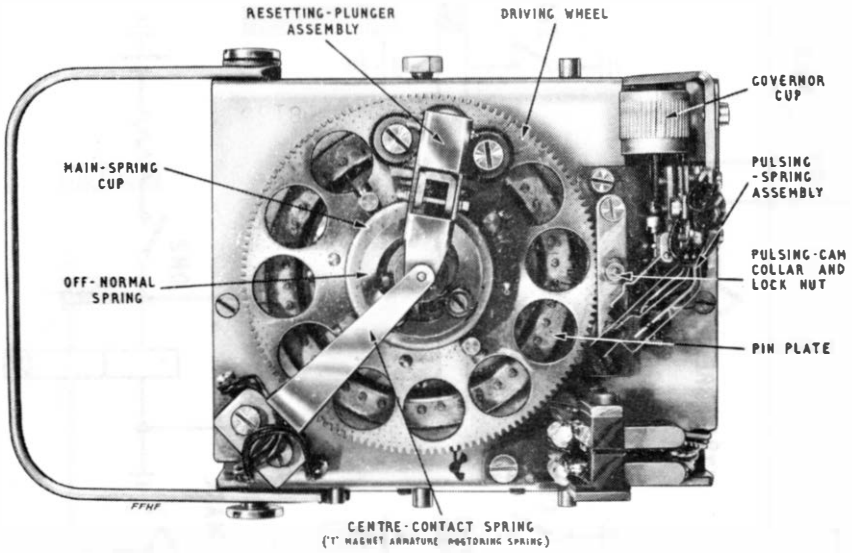


Fig. 8-12 Pulse Correction Elements (DC2)



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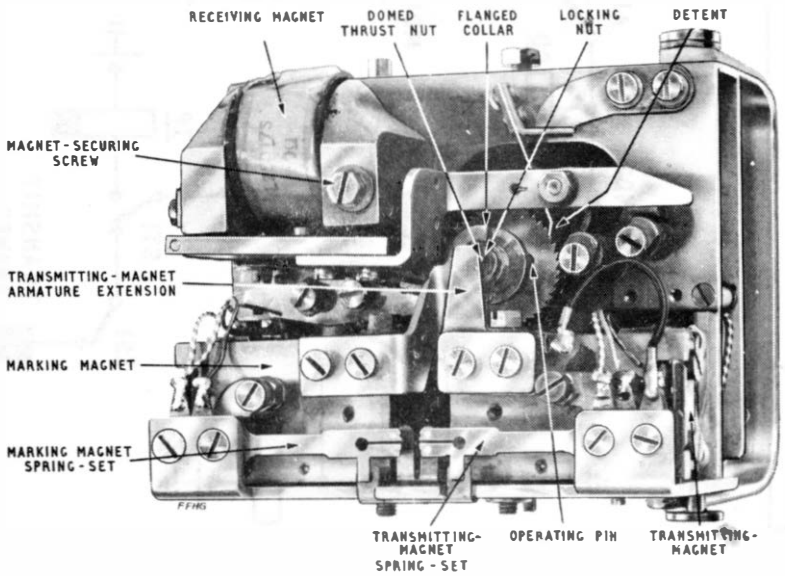

R35759

Fig. 8-13 Front and Rear views of a Mechanical Pulse Regenerator

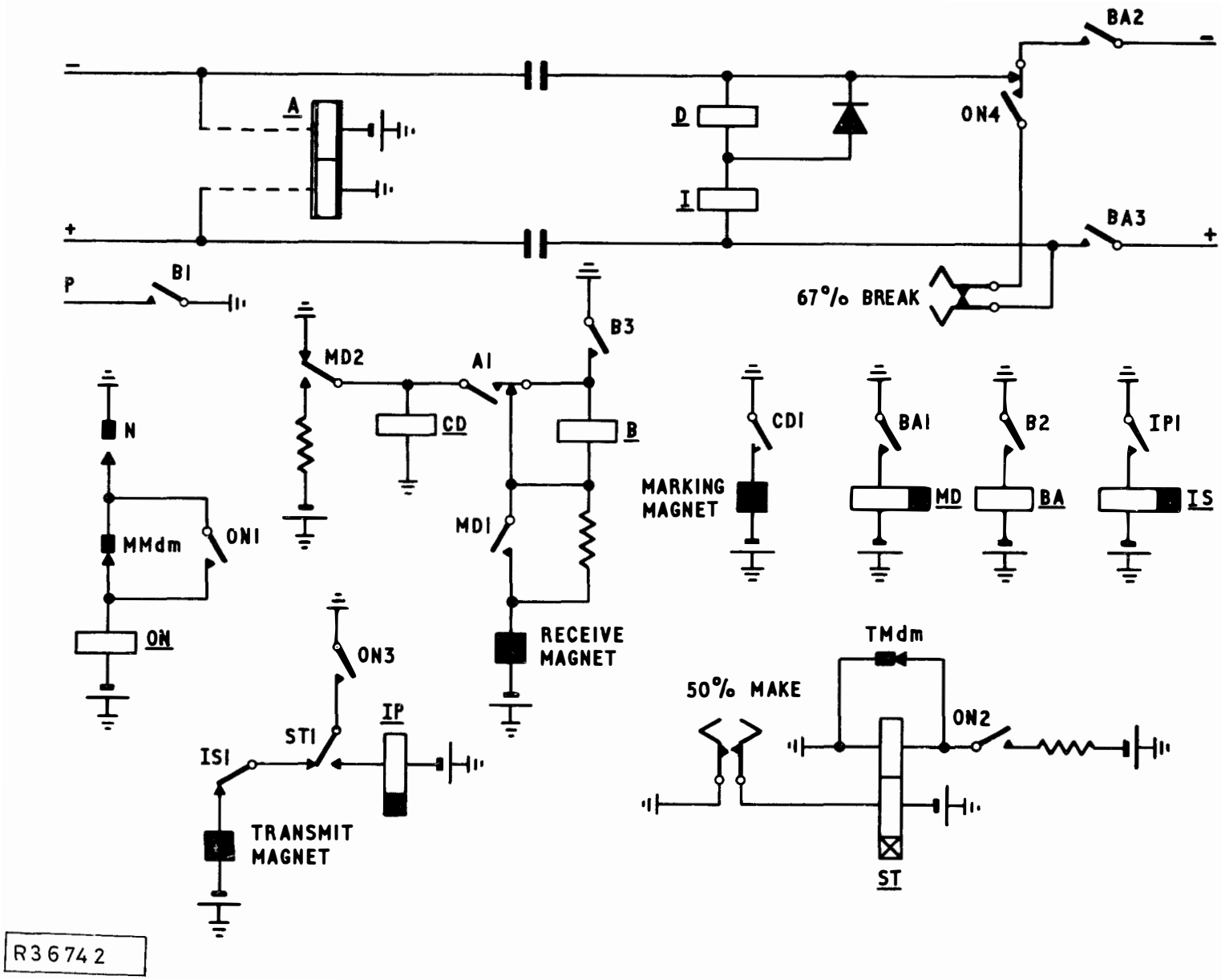

Fig. 8-14 Control Circuit for Mechanical Pulse Regenerator

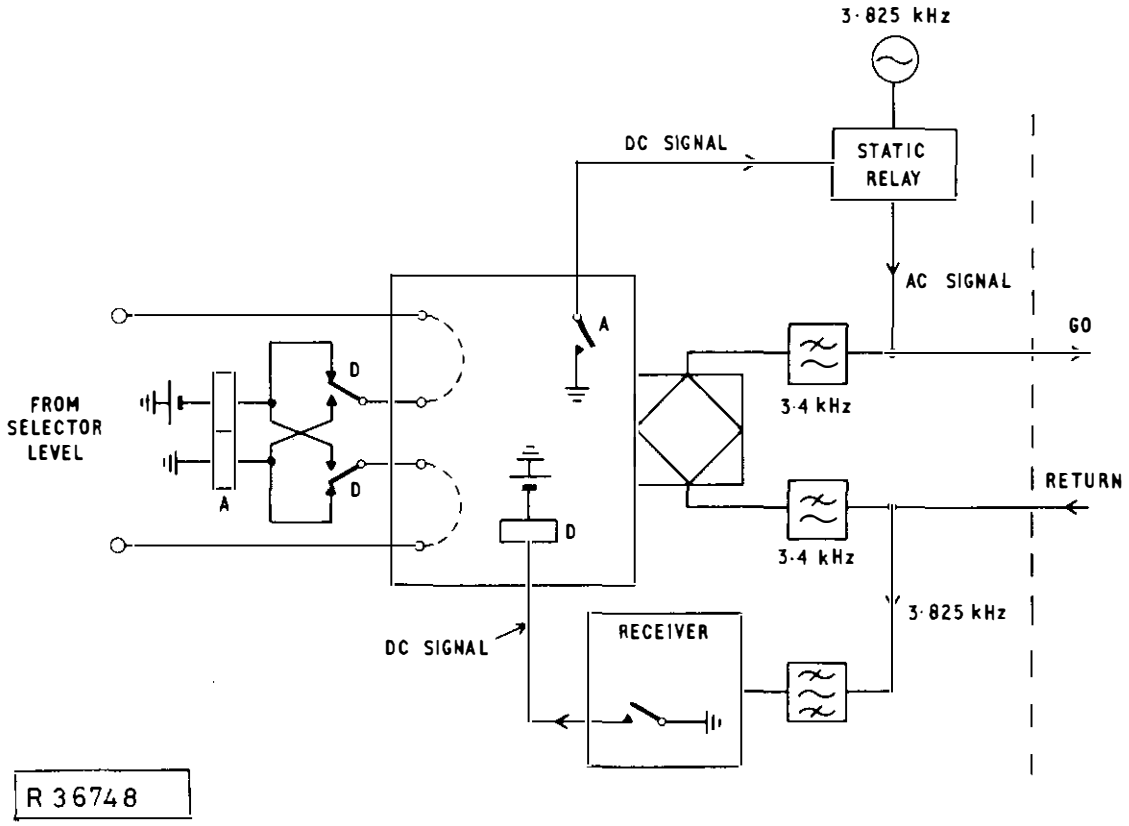

Fig. 9-1 Out-of-Speechband Signalling System

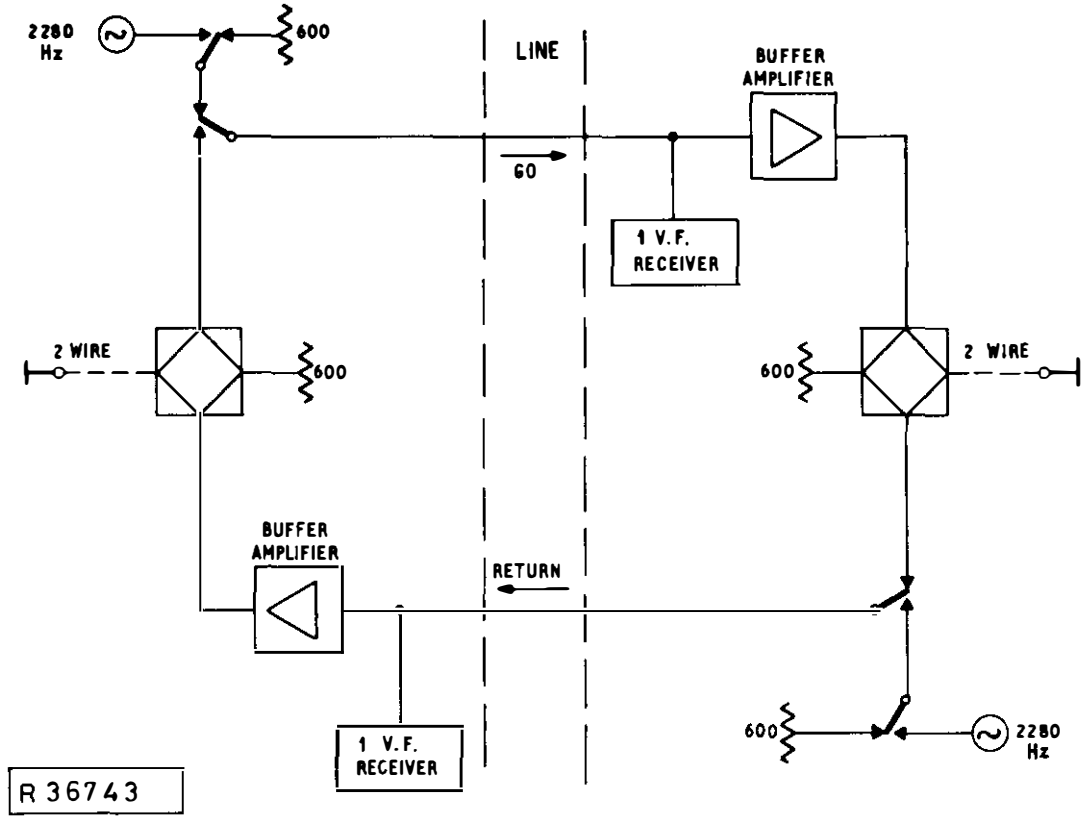

Fig. 9-2 IVF Inband Signalling System

OUTGOING END SIGNALS	LINE SIGNALS (2280 Hz TONE) TIME IN MILLISECONDS	INCOMING END SIGNALS
SEIZURE	65 →	LOOP TO I/C SELECTOR
DIAL PULSES (LOOP-DIS.)	60 60 →	SELECTOR STEPS (LOOP-DIS. PULSING)
REVERSAL REPEATED	← 250	CALLED SUB ANSWERS (REVERSAL OF + AND −)
RESTORATION REPEATED	← 250	CALLED SUB CLEARS (+ AND − RESTORED TO NORMAL)
CALLING SUB CLEARS	900 →	SELECTOR RELEASED I/C RELAY SET CLEARS AND RELEASE GUARD RETURNED TO O/G END (AVERAGE TIME SHOWN)
O/G RELAY SET FREE AGAIN FOR SERVICE	← 1000	
O/G RELAY SET BUSIED ALARM GIVEN AFTER 6-12 MINUTES	← CONTINUOUS	BUSY BACK FACILITY

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Fig. 9-3 Line Signal Timings of 1 VF Signalling System

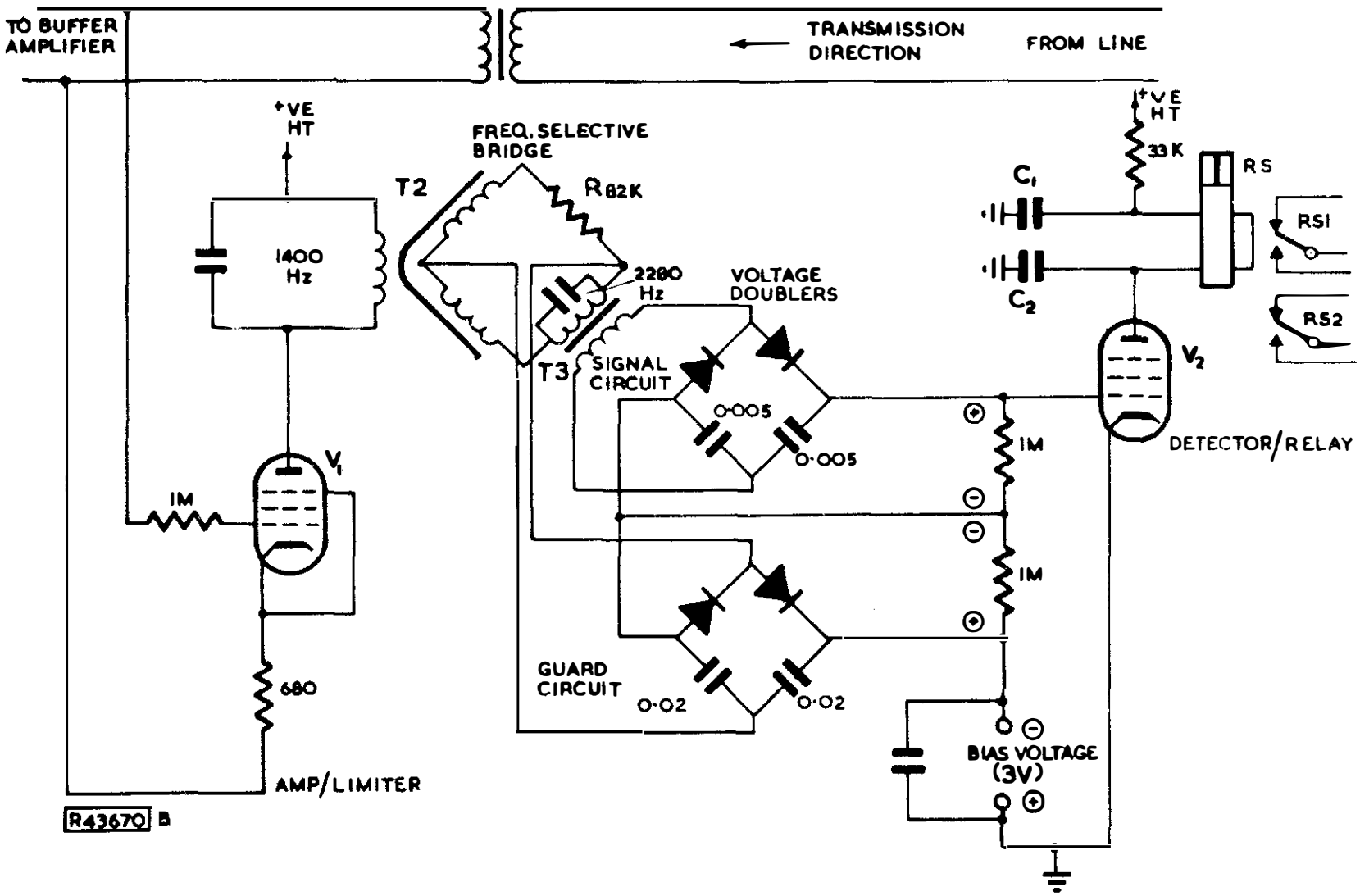


Fig. 9-4 Elements of Receiver Circuit of 1 VF Signalling System

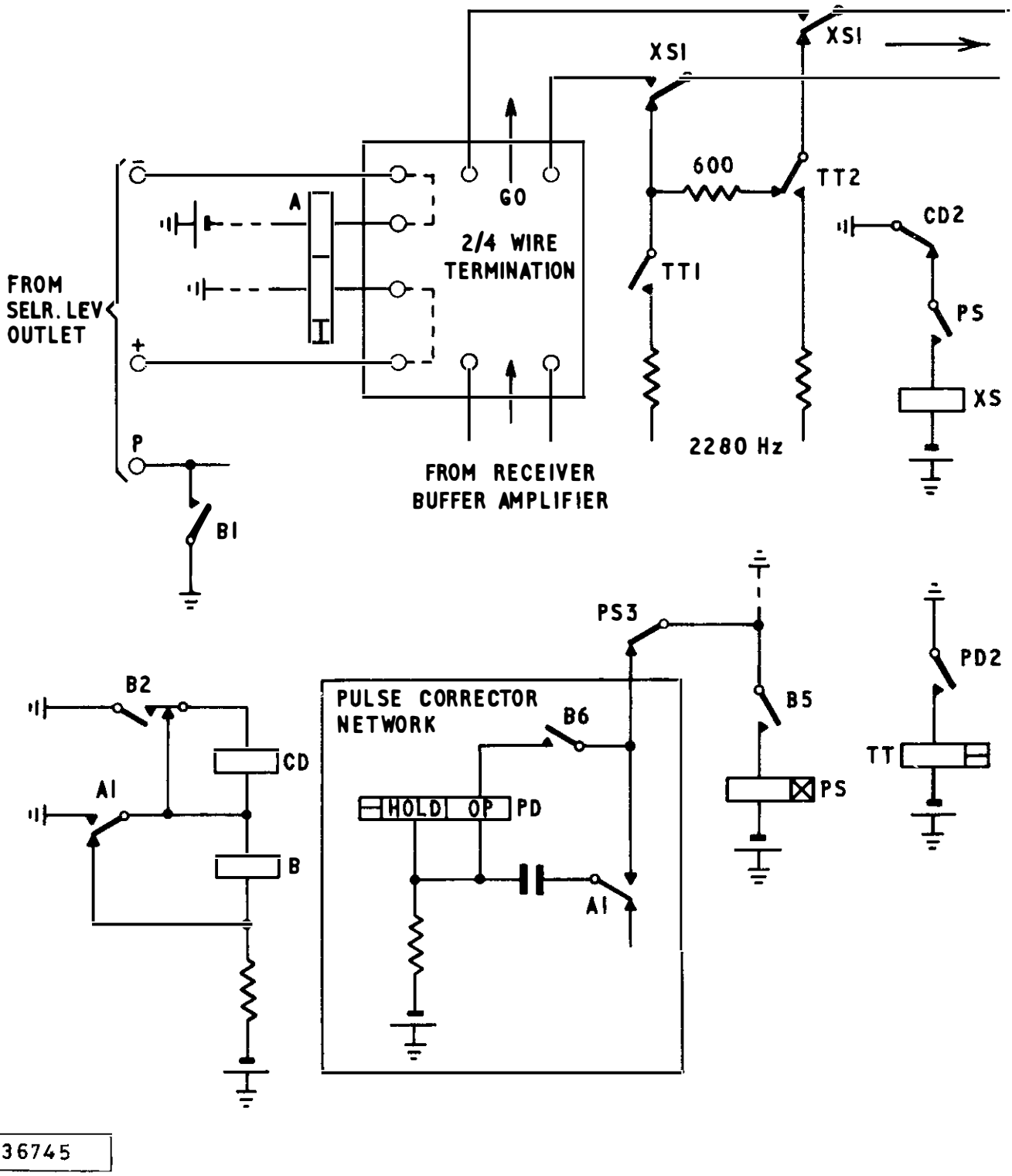


Fig. 9-5 Seizure and Pulsing Element of 1 VF Signalling System

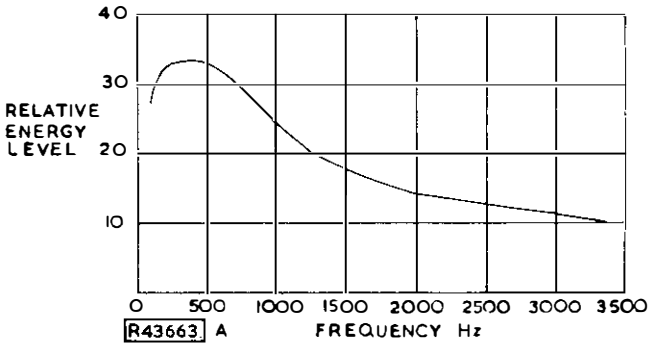


Fig. 9-6 Relative energy levels of normal speech

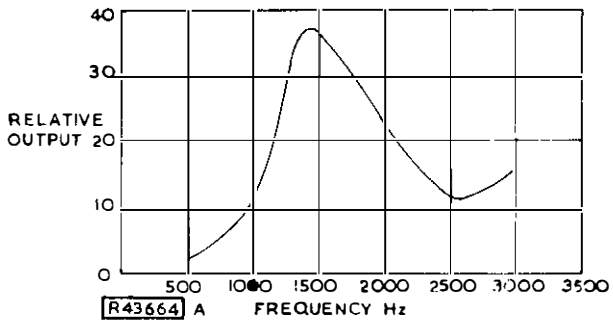


Fig. 9-7 Characteristic of the telephone microphone

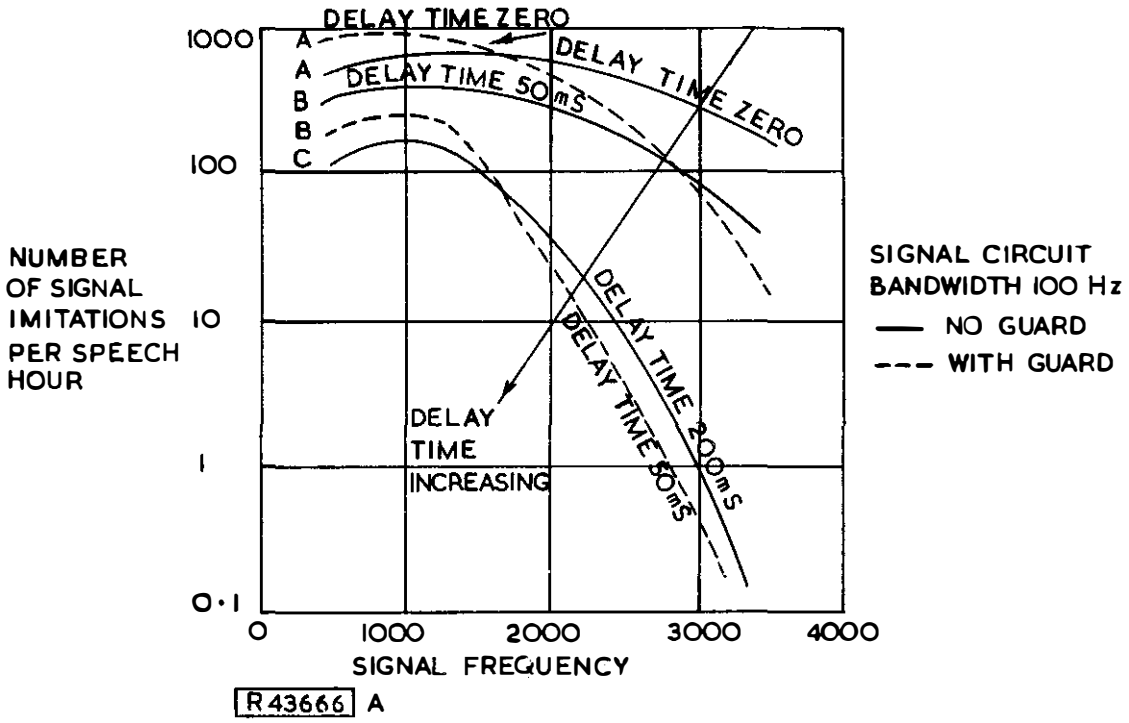


Fig. 9-8 Results of a test made to determine the best region for the selection of the signalling frequency of a 1 VF system.

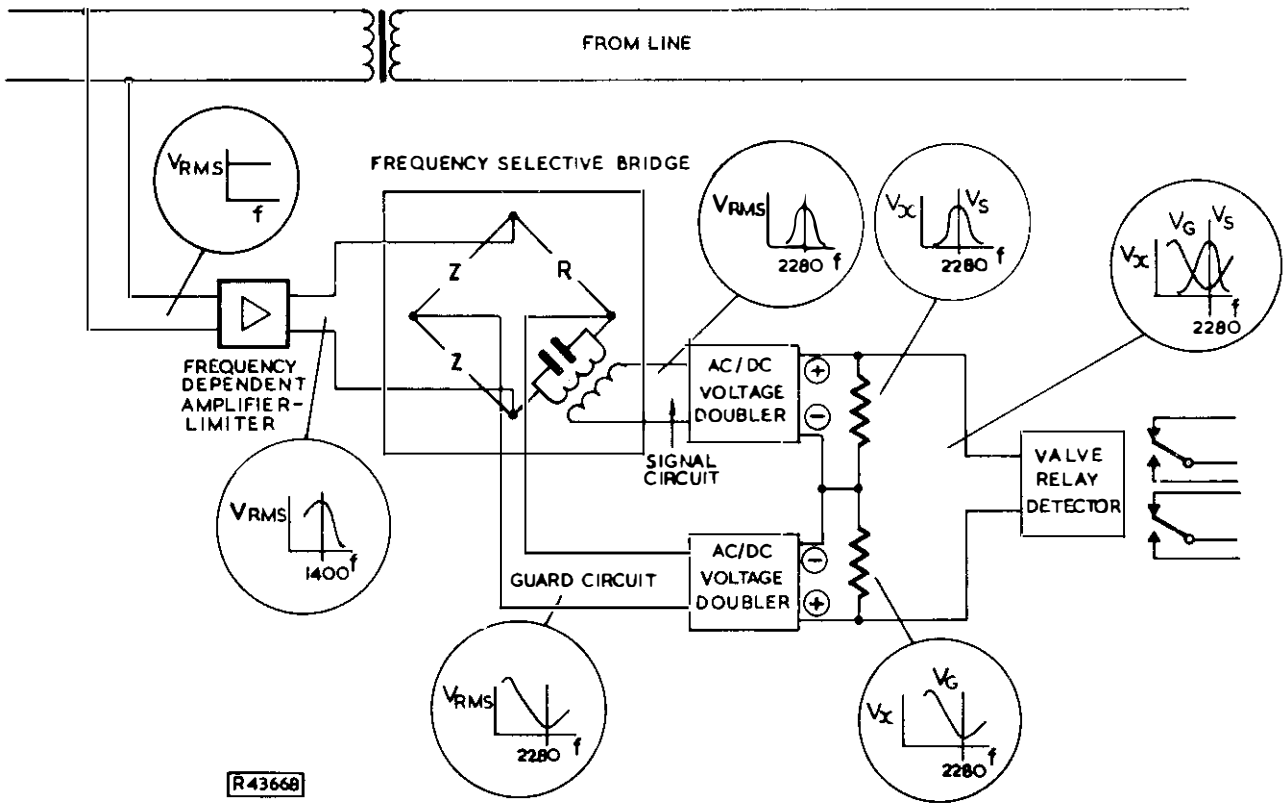


Fig. 9-9 1 VF receiver circuit schematic layout showing frequency characteristics

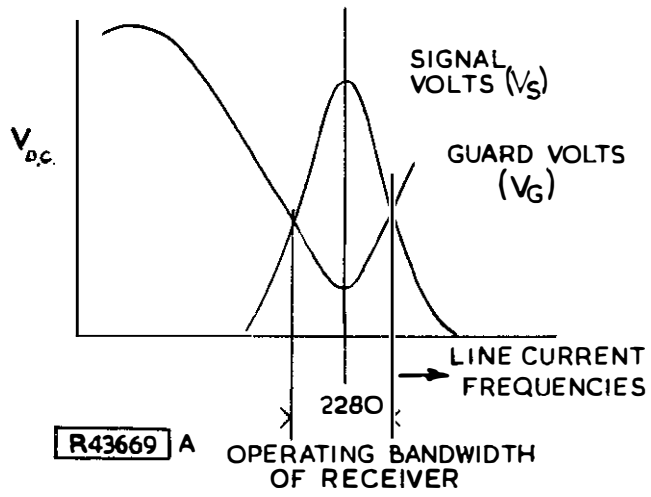


Fig. 9-10 Bandwidth limits of 1 VF Receiver

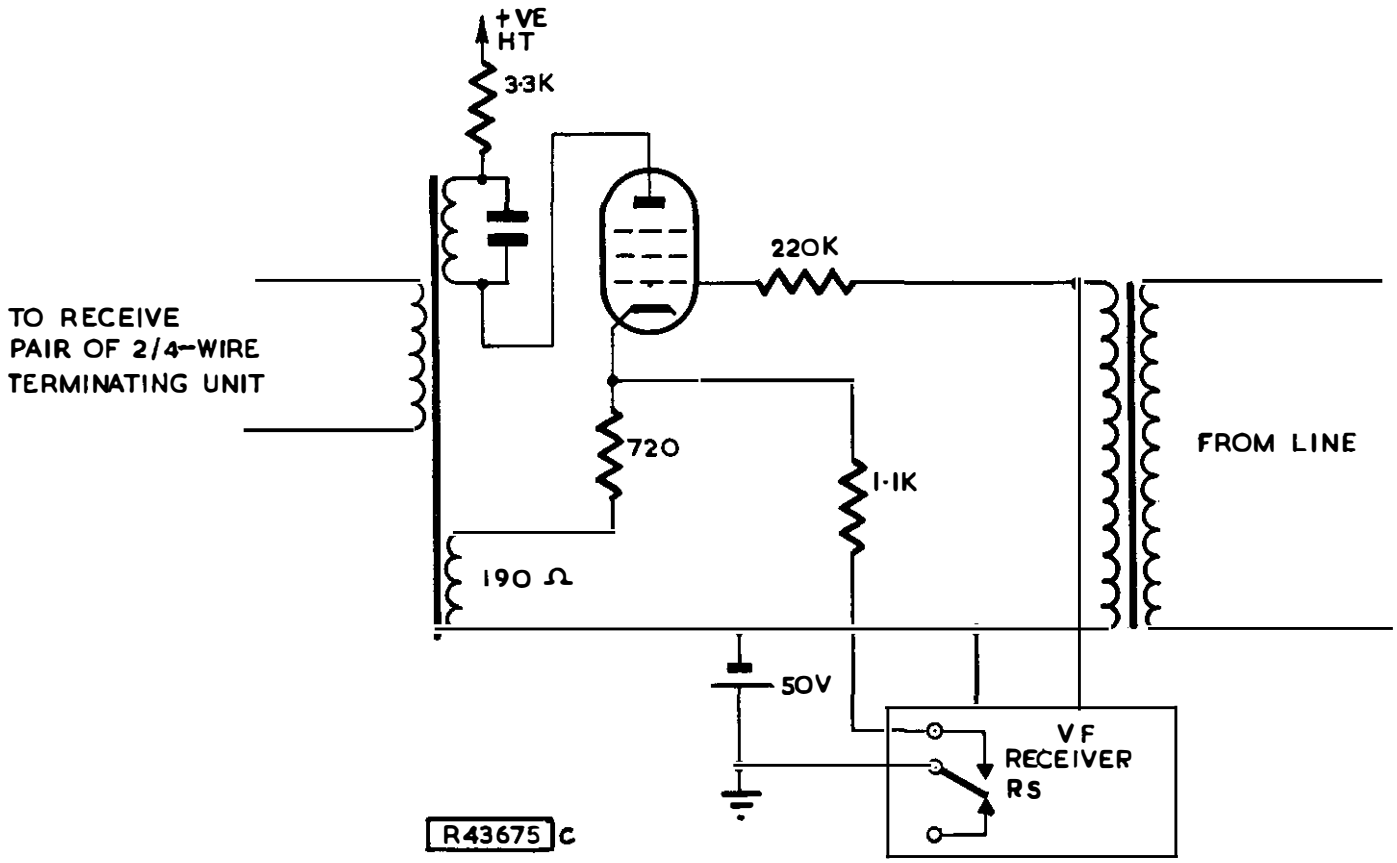


Fig. 9-11 1 VF Buffer Amplifier. Principle of operation

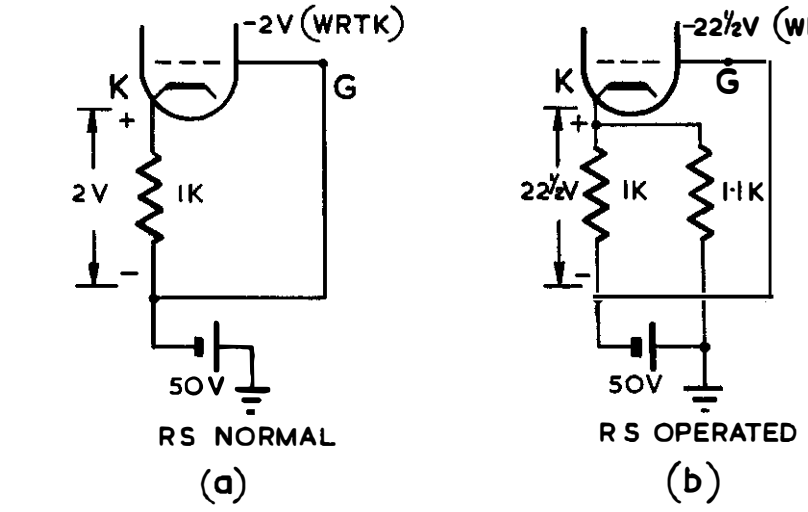


Fig. 9-12 1 VF Buffer Amplifier. Changing grid bias of valve by RS contact to achieve Line Splitting facility

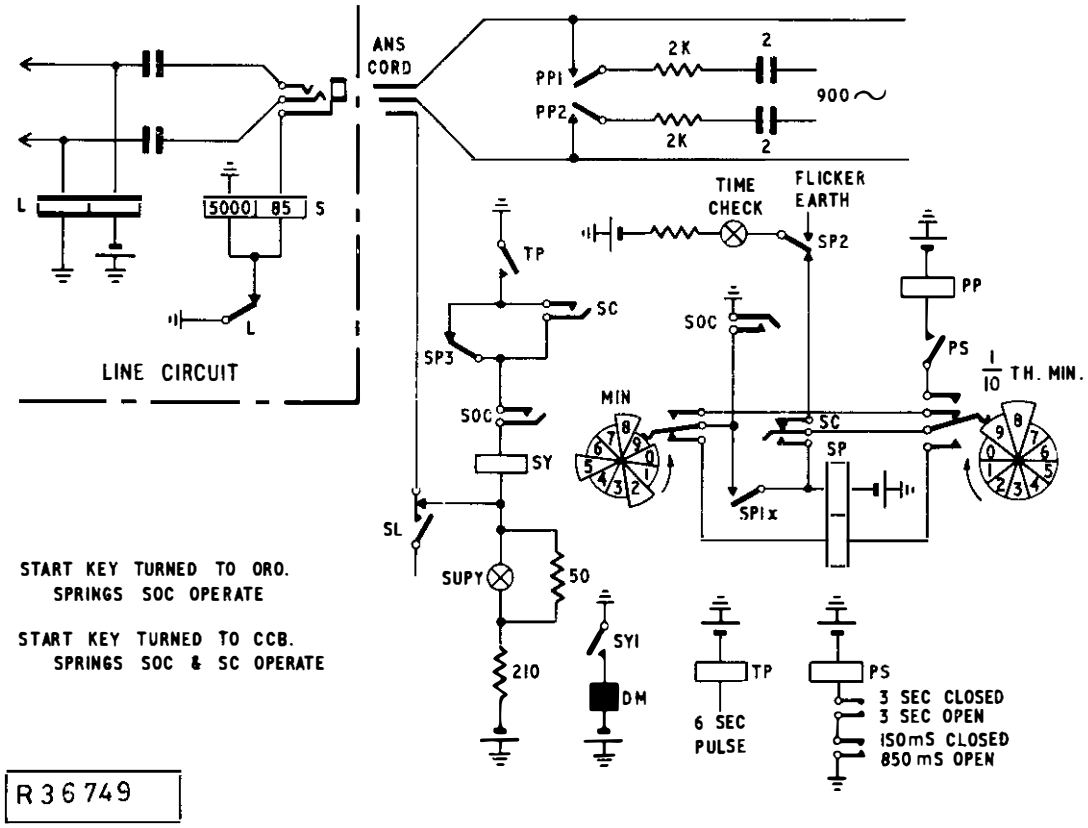


Fig. 10-1 Operation of Chargeable Time Clock

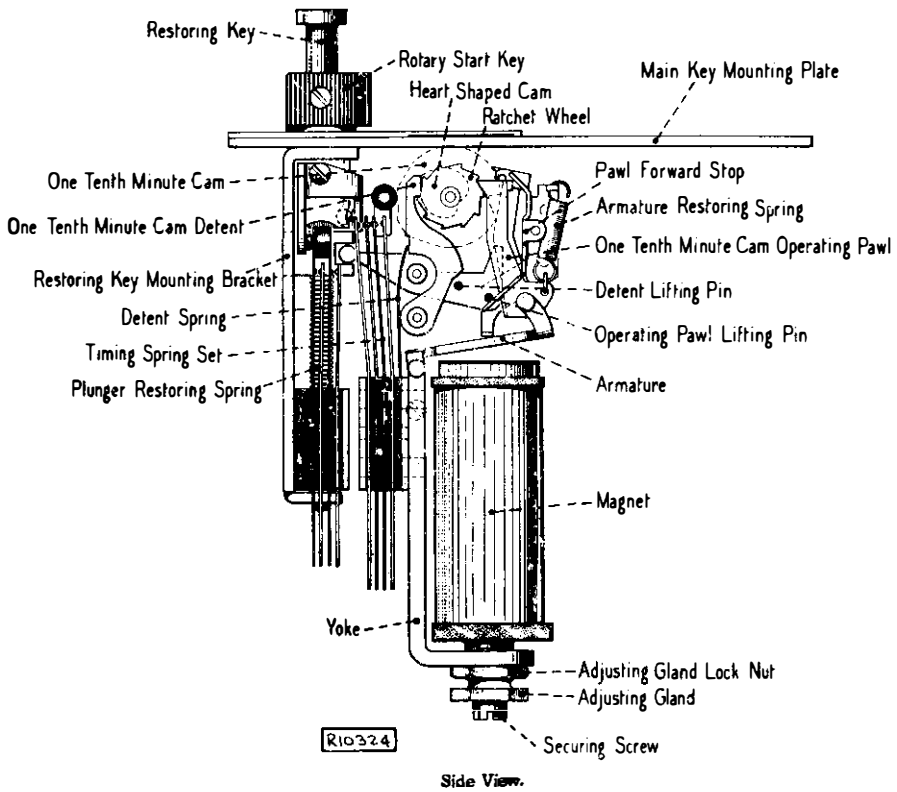


Fig. 10-2 Construction of Chargeable Time Clock

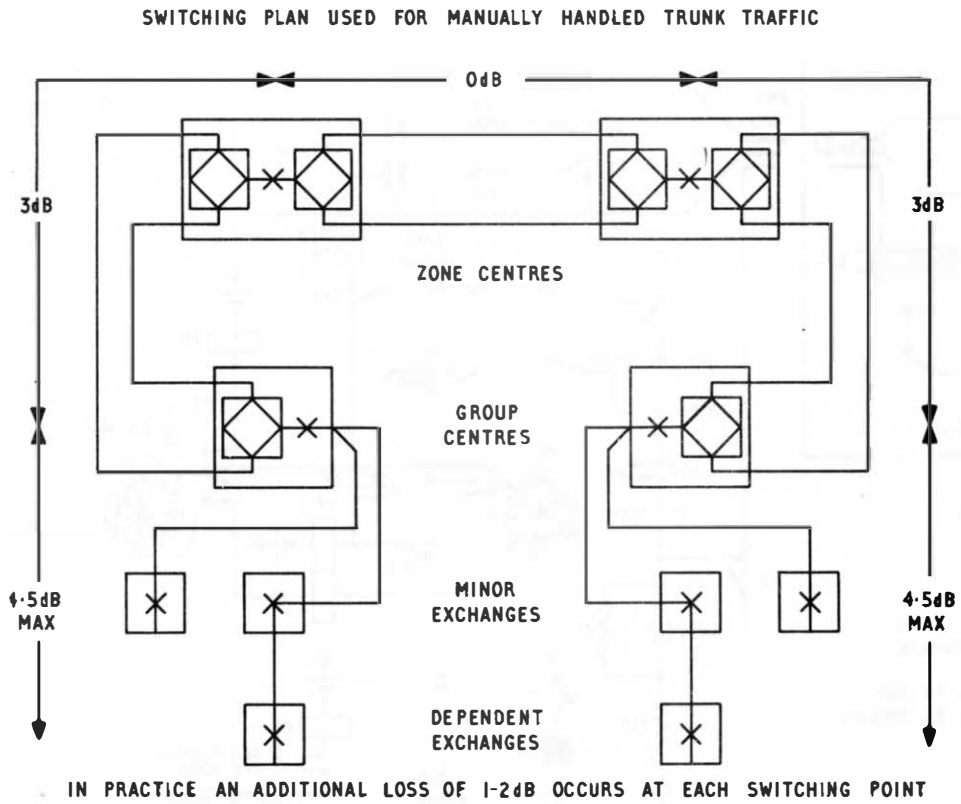


Fig. 10-3 Transmission Plan - 2 Wire Switching

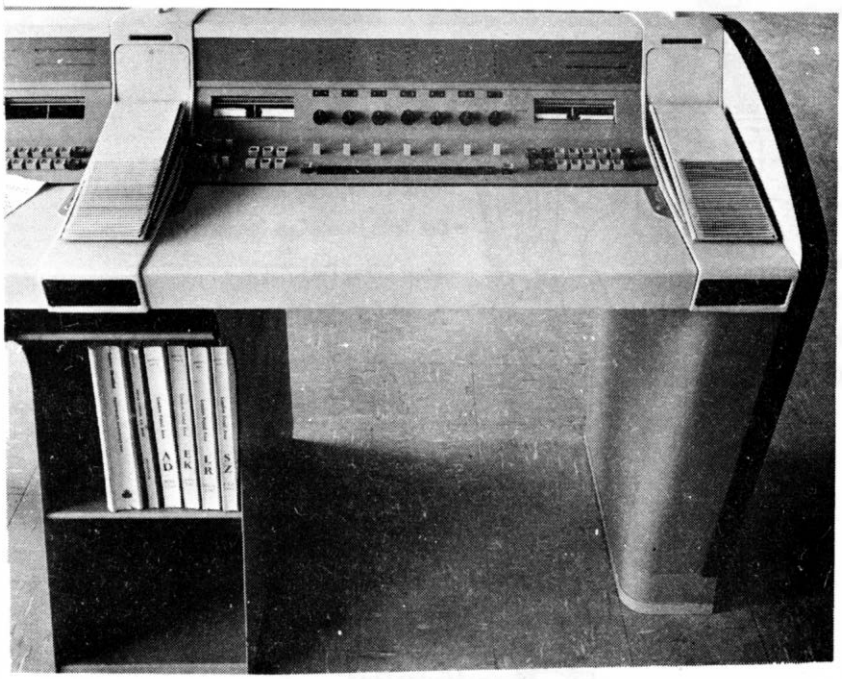


Fig. 10-4 Operator's Position - Cordless Switchboard

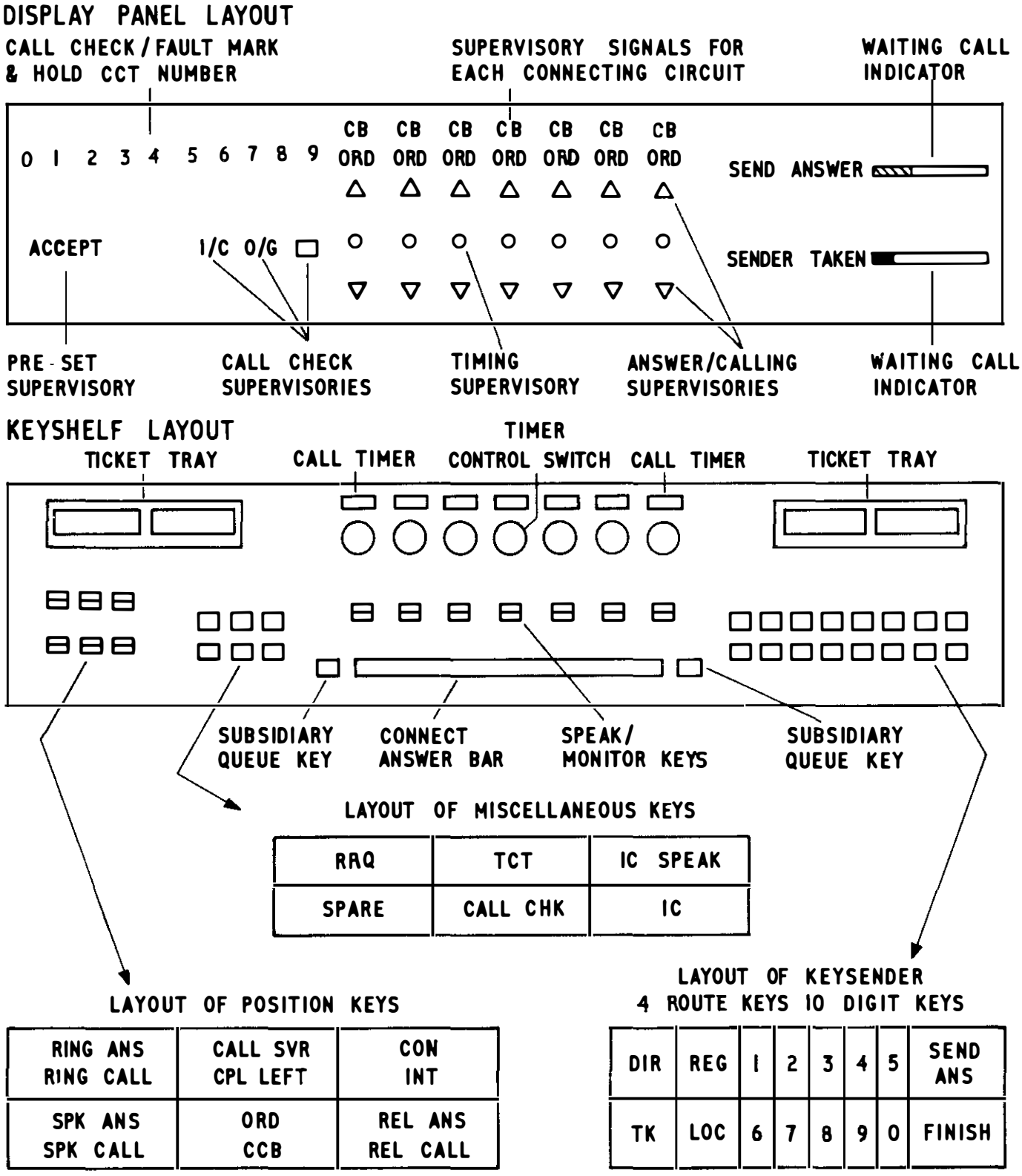


Fig. 10-5 Cordless Switchboard Layout

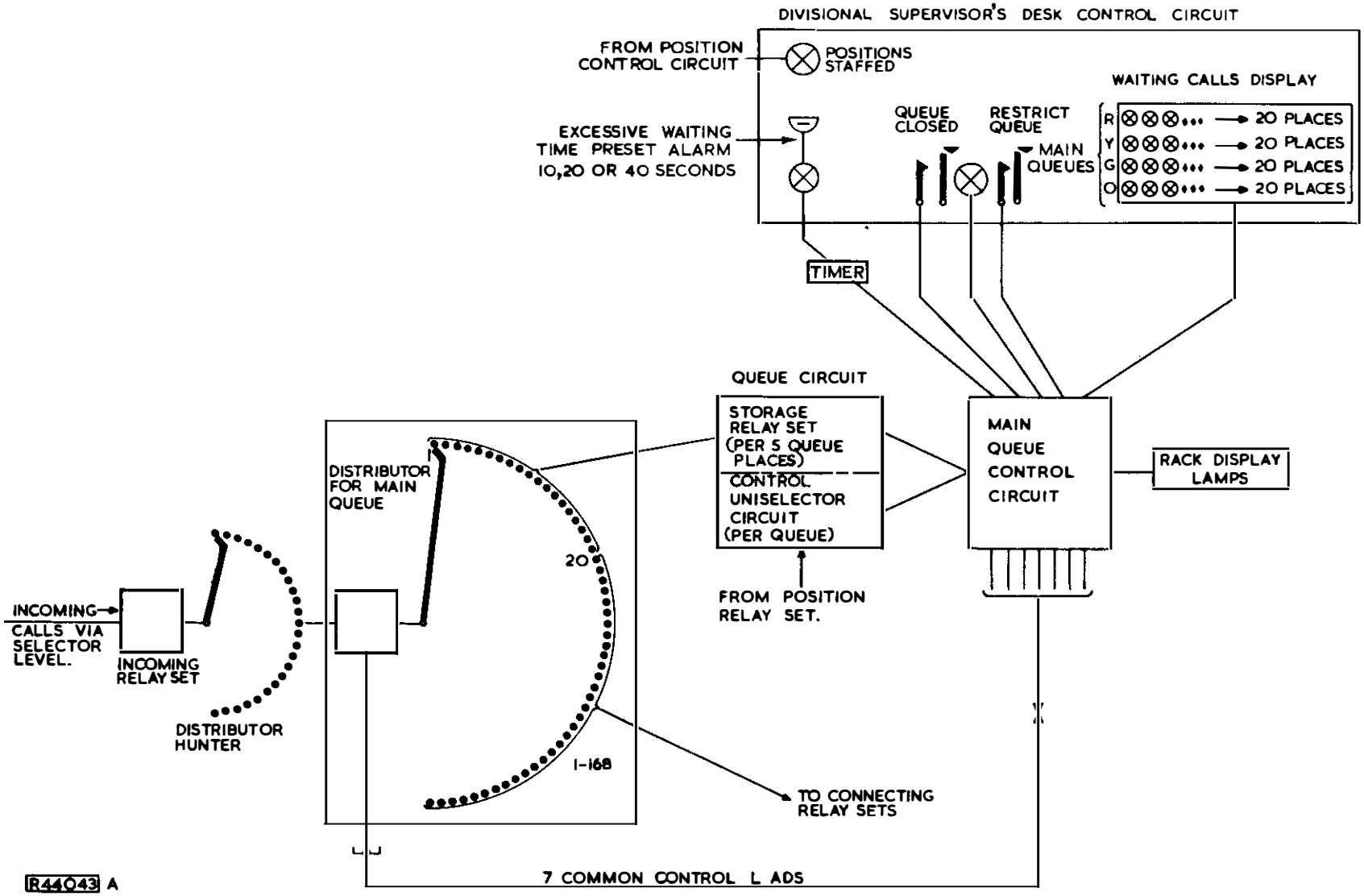


Fig. 10-6 Queue Control System of Cordless Switchboard

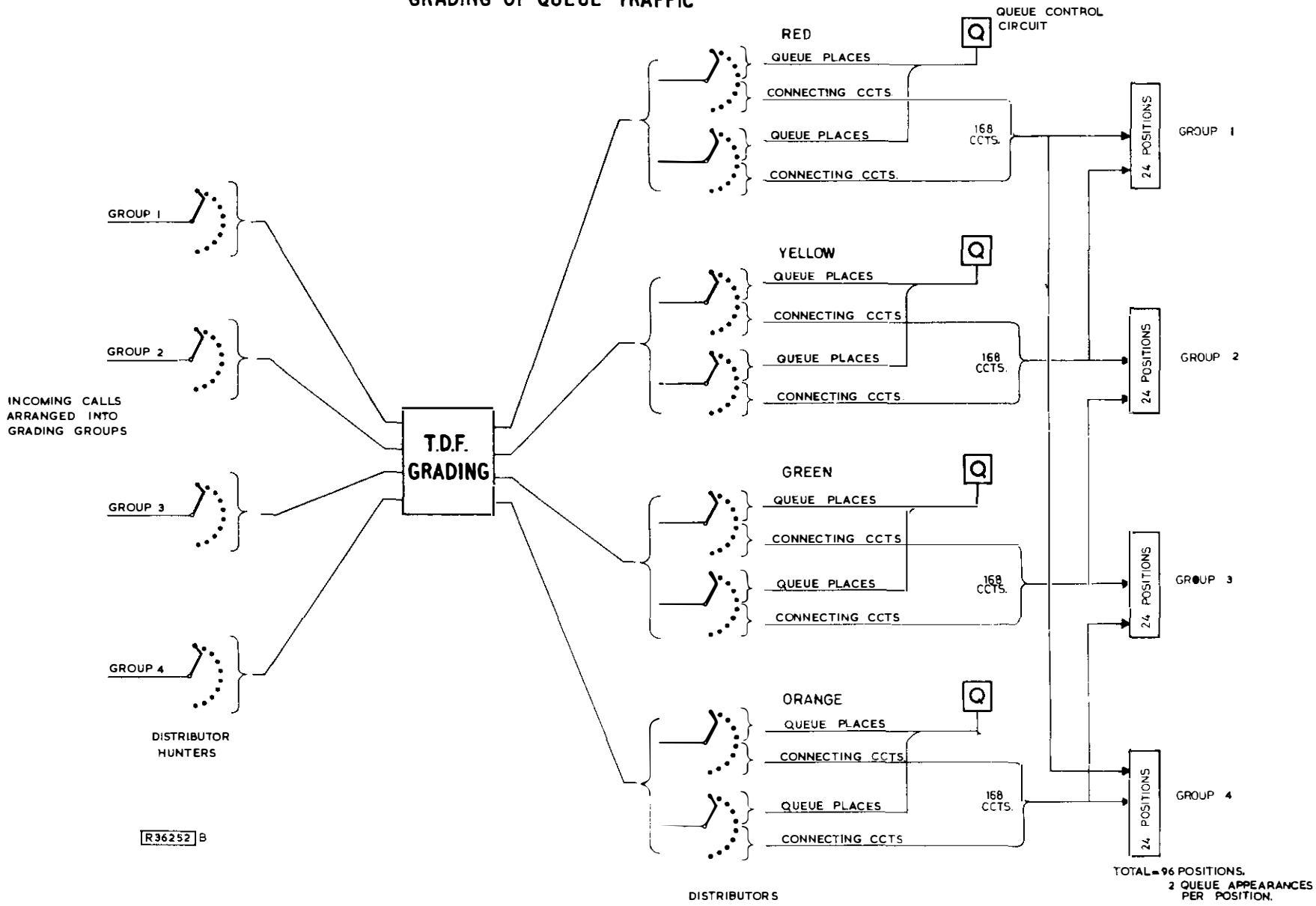


Fig. 10-7 Method of Grading Queue Traffic on Cordless Switchboards

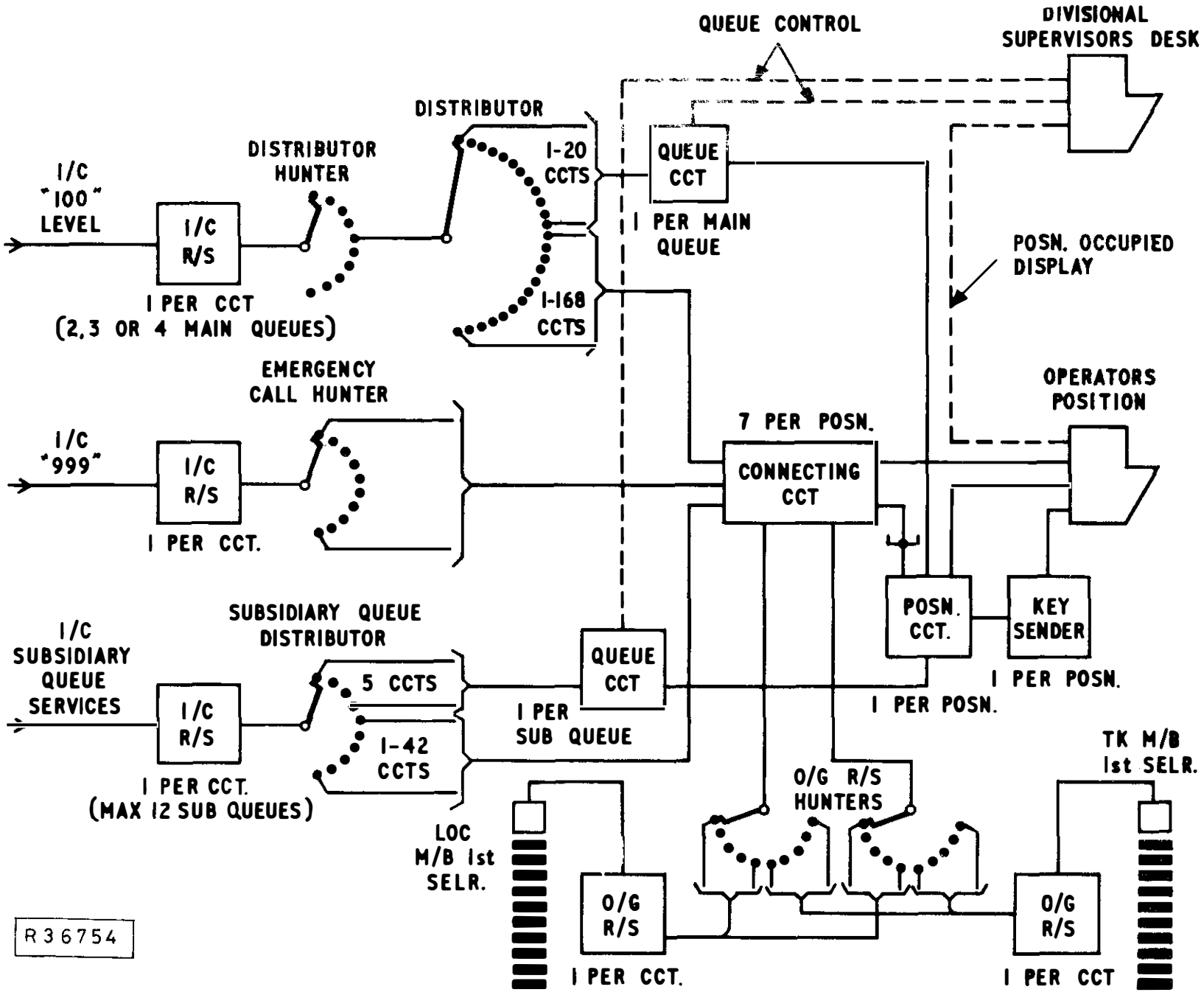


Fig. 10-8 Cordless Switchboard Trunking

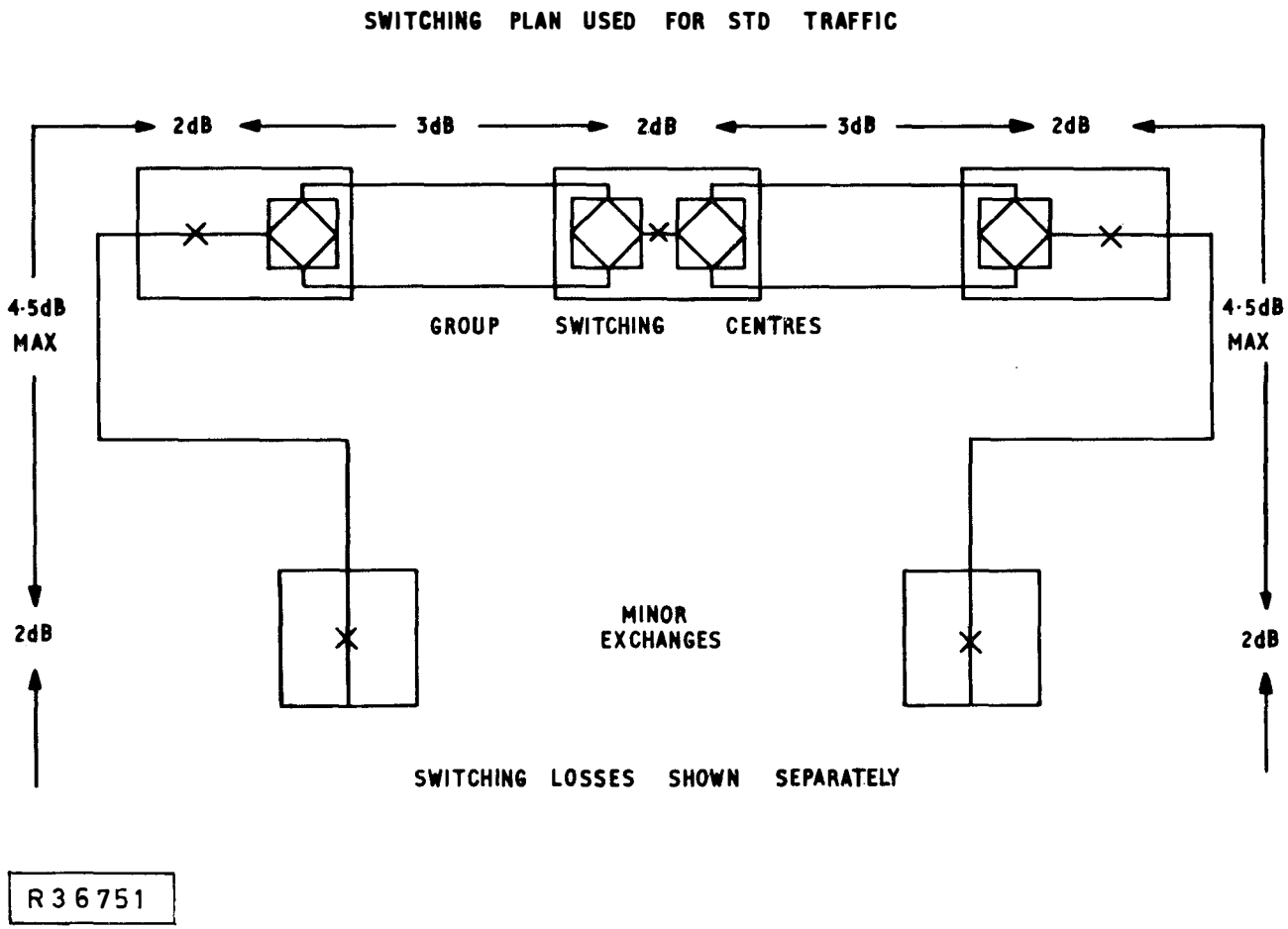


Fig. 11-1 Transmission Plan - 2 wire Switching (STD)

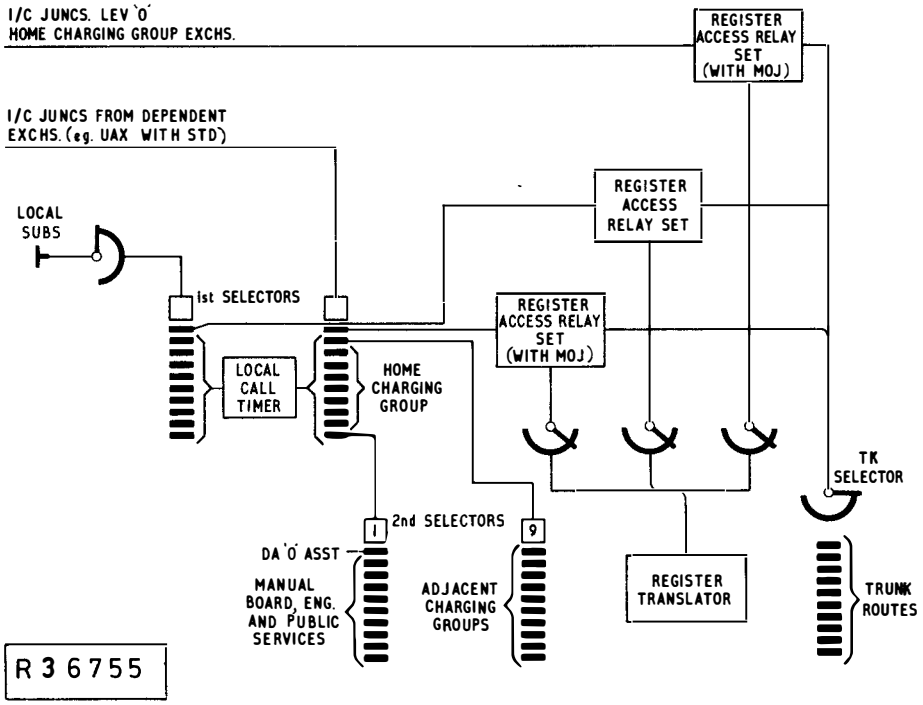


Fig. 11-2 Non-Director STD Trunking

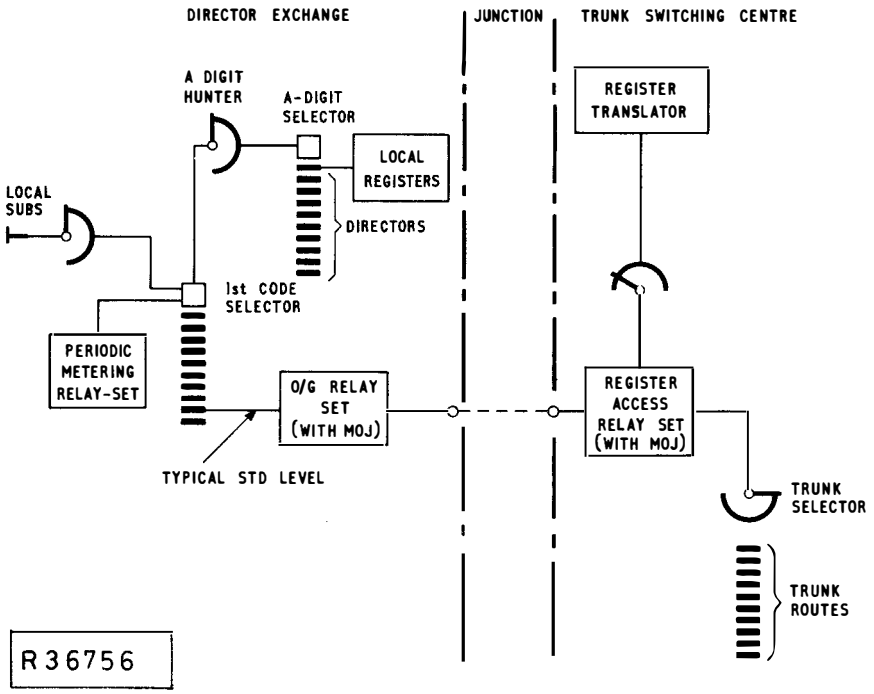


Fig. 11-3 Director STD Trunking

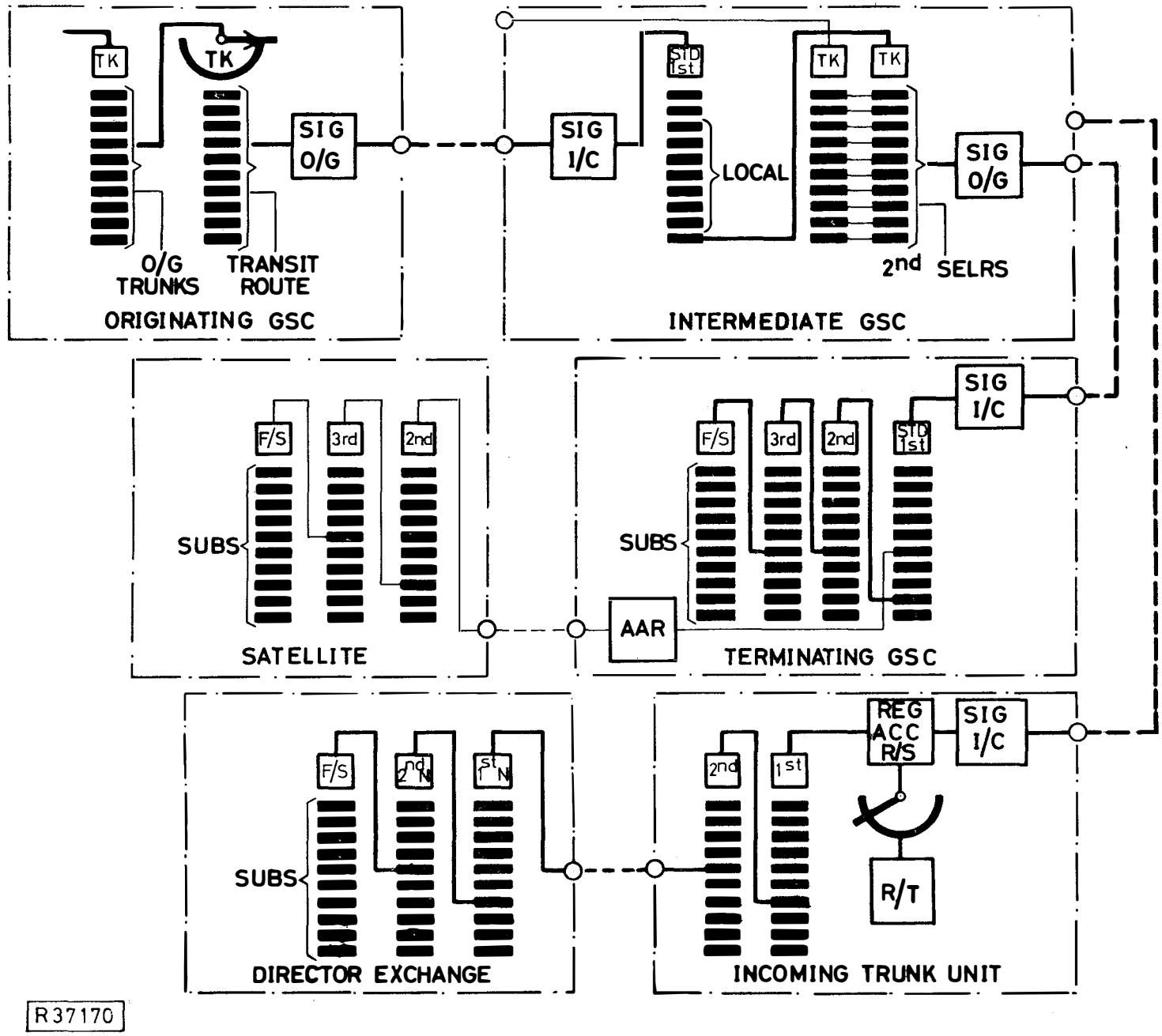


Fig. 11-4 STD Call - Typical Routing

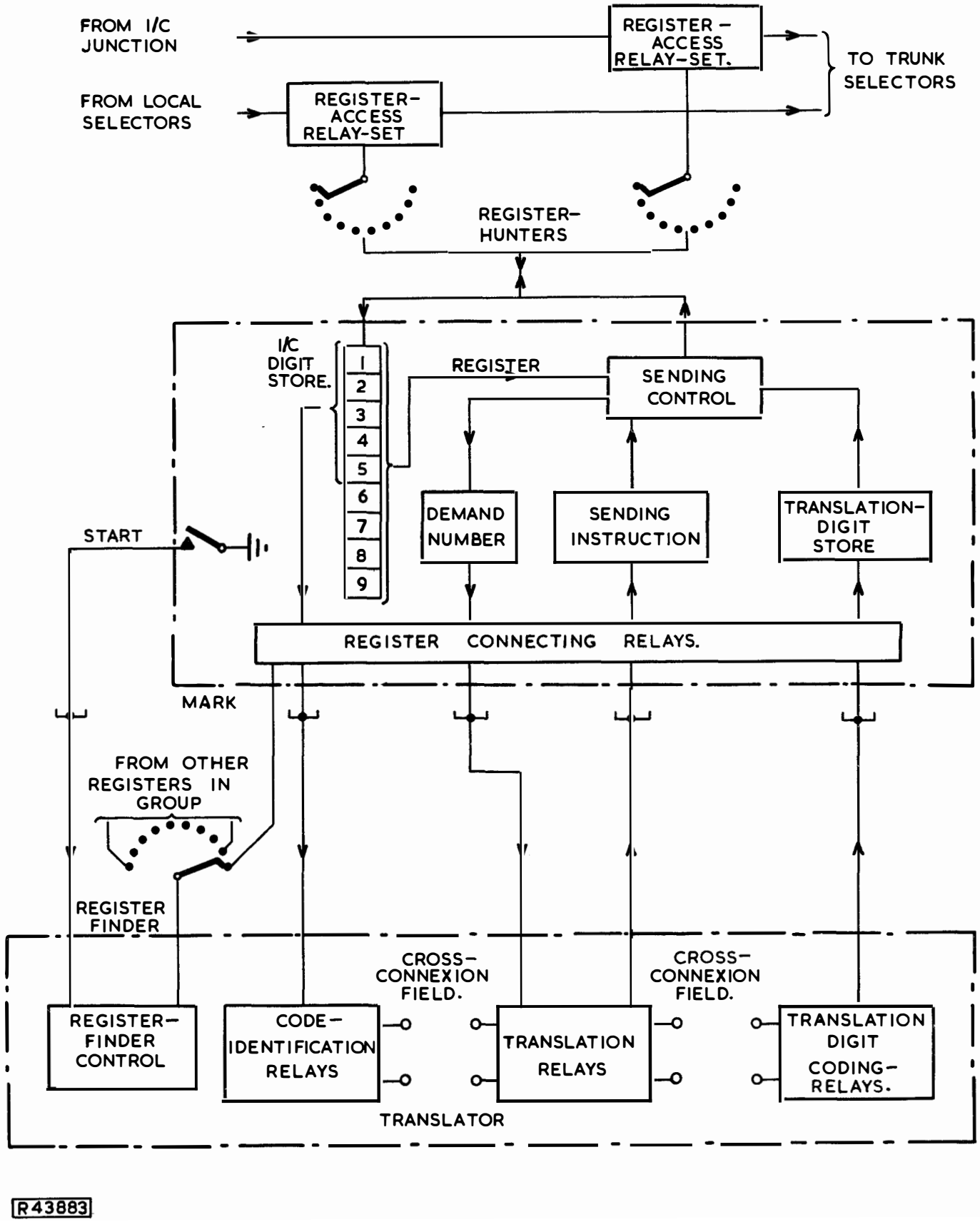


Fig. 12-1 Block Diagram of Electromechanical Register Translator

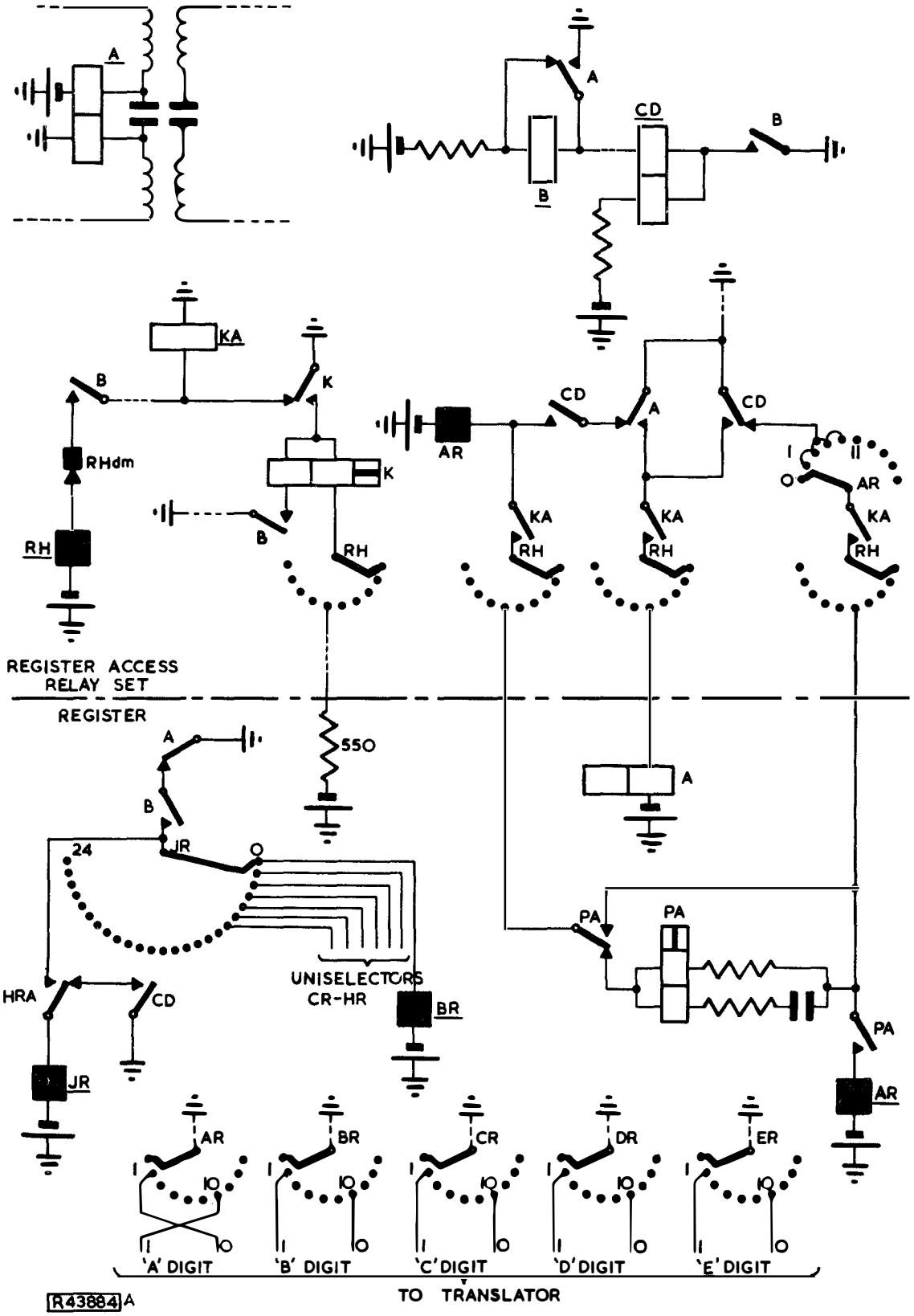


Fig. 12-2 Receipt and Storage of National number in Controlling Register

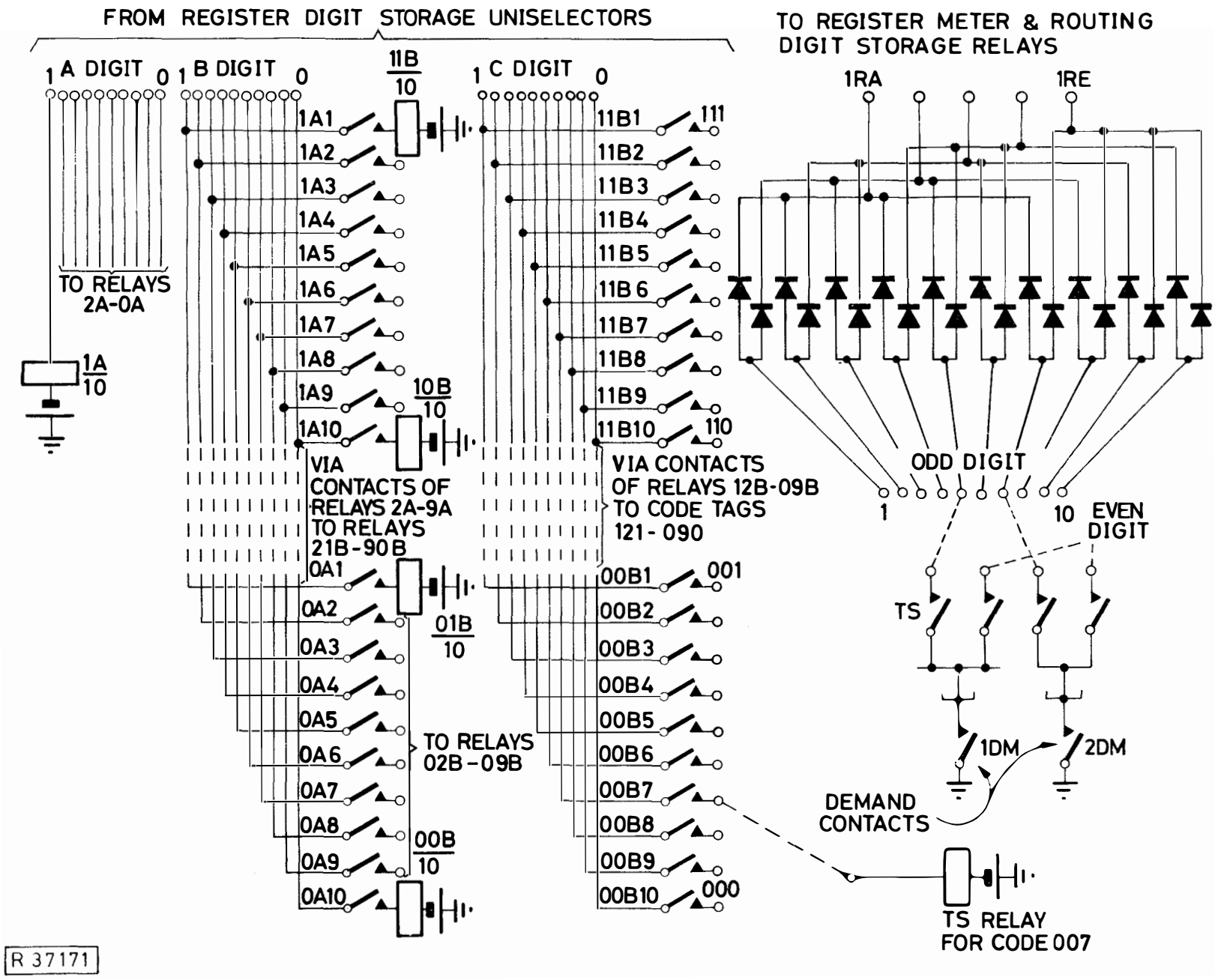


Fig. 12-3 Translation

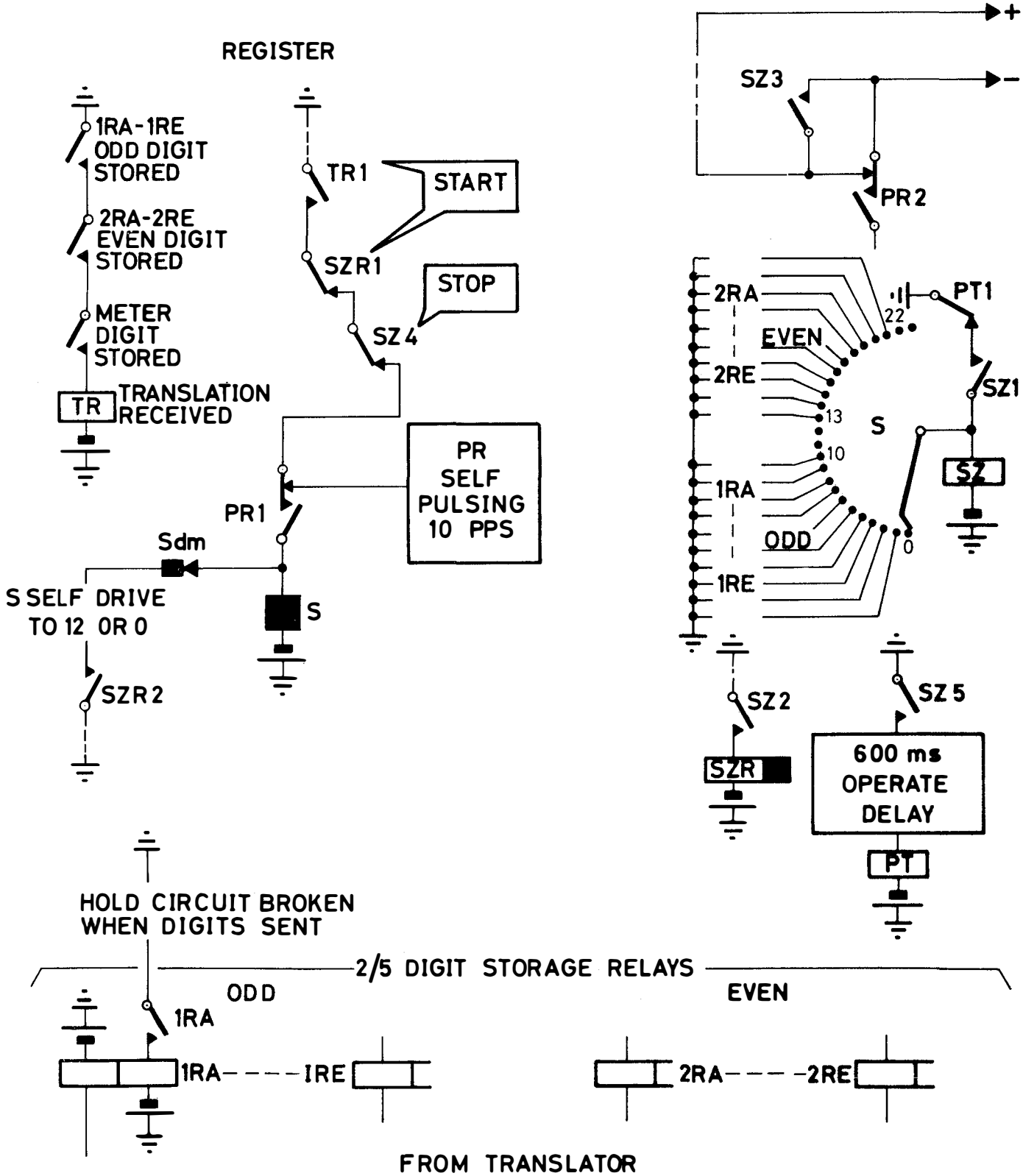


Fig. 12-4 Register Storage and Sending

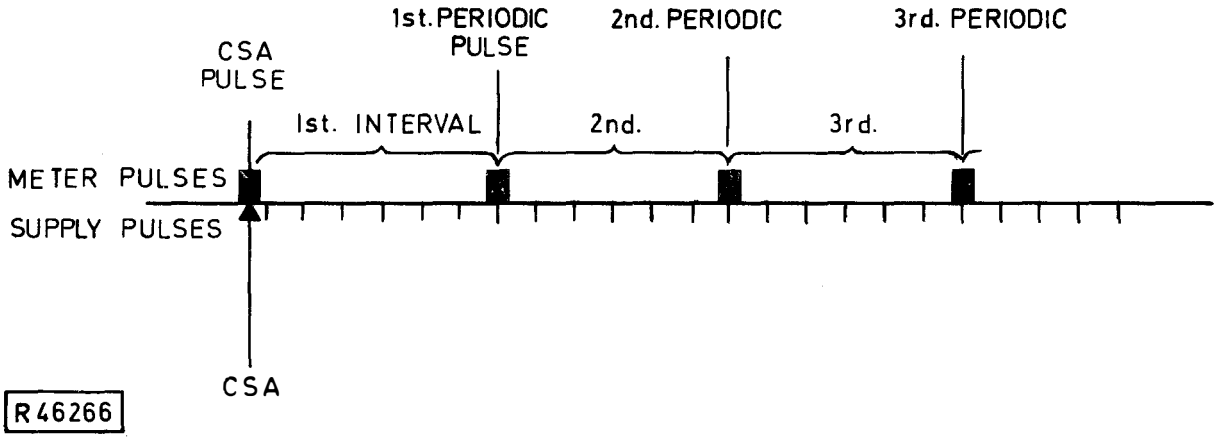


Fig. 12-5 Principle of Periodic Metering

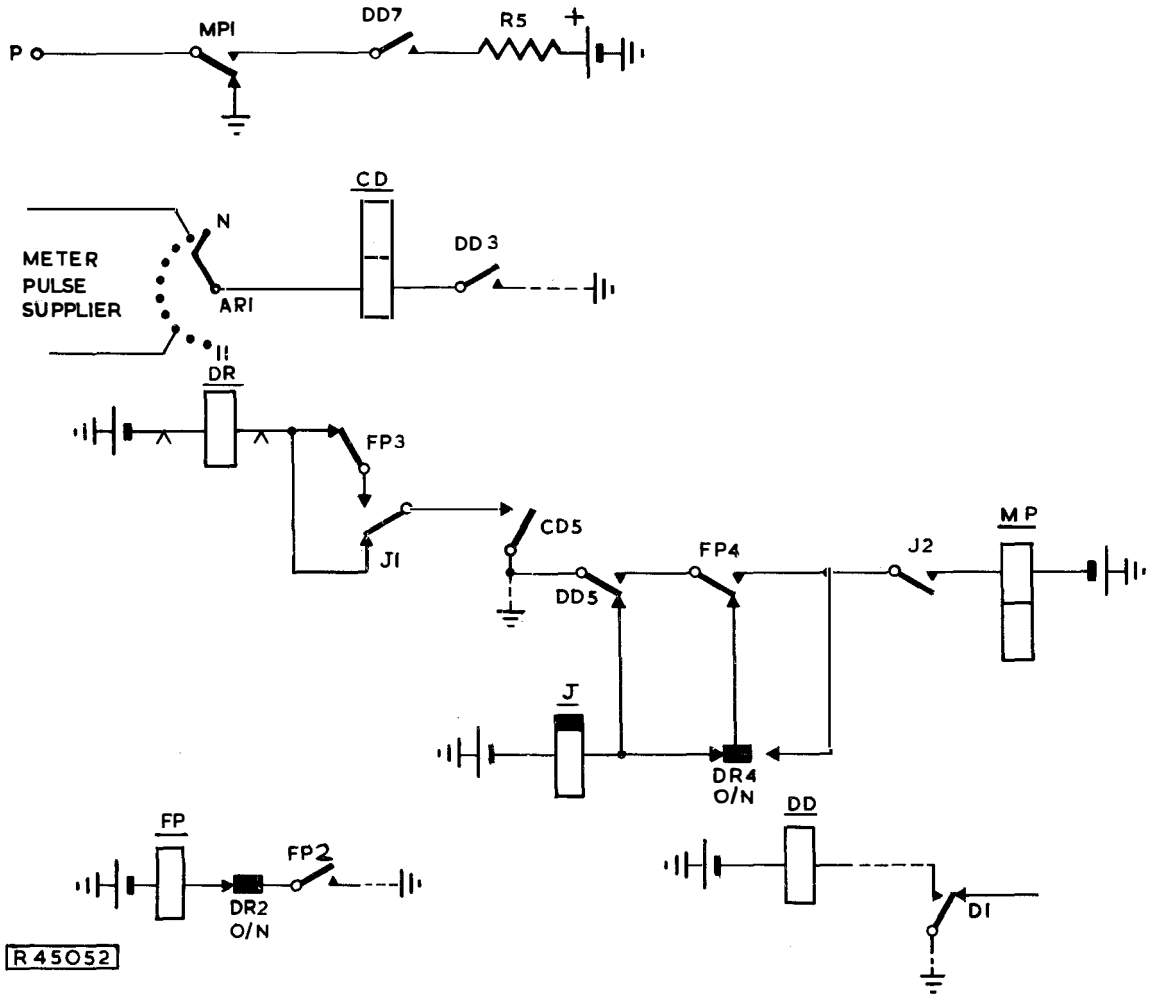
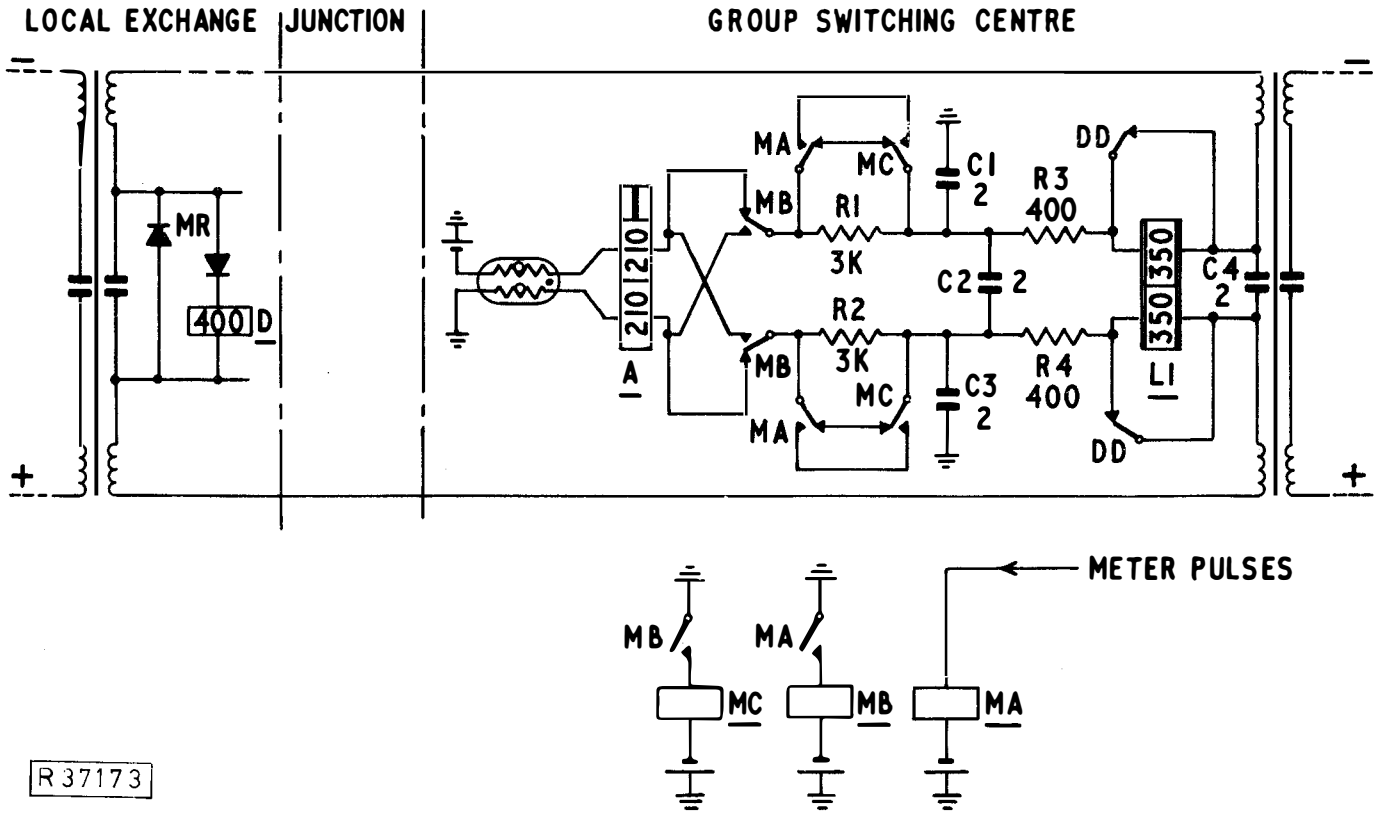


Fig. 12-6 Control of Metering in the Register Access Relay Set



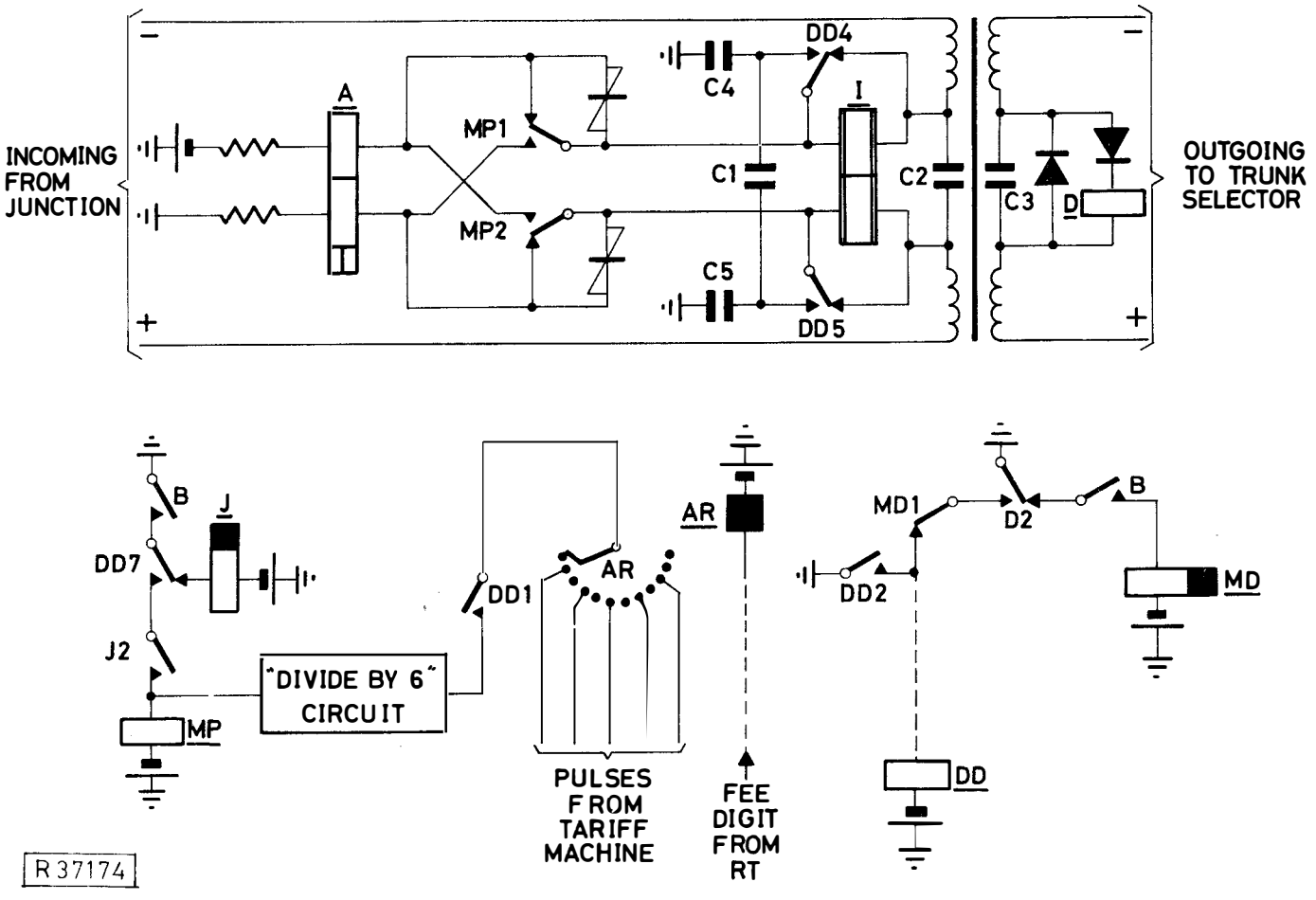


Fig. 12-7 Register Access Relay Set - 2 Methods of Transmitting MOJ Signals

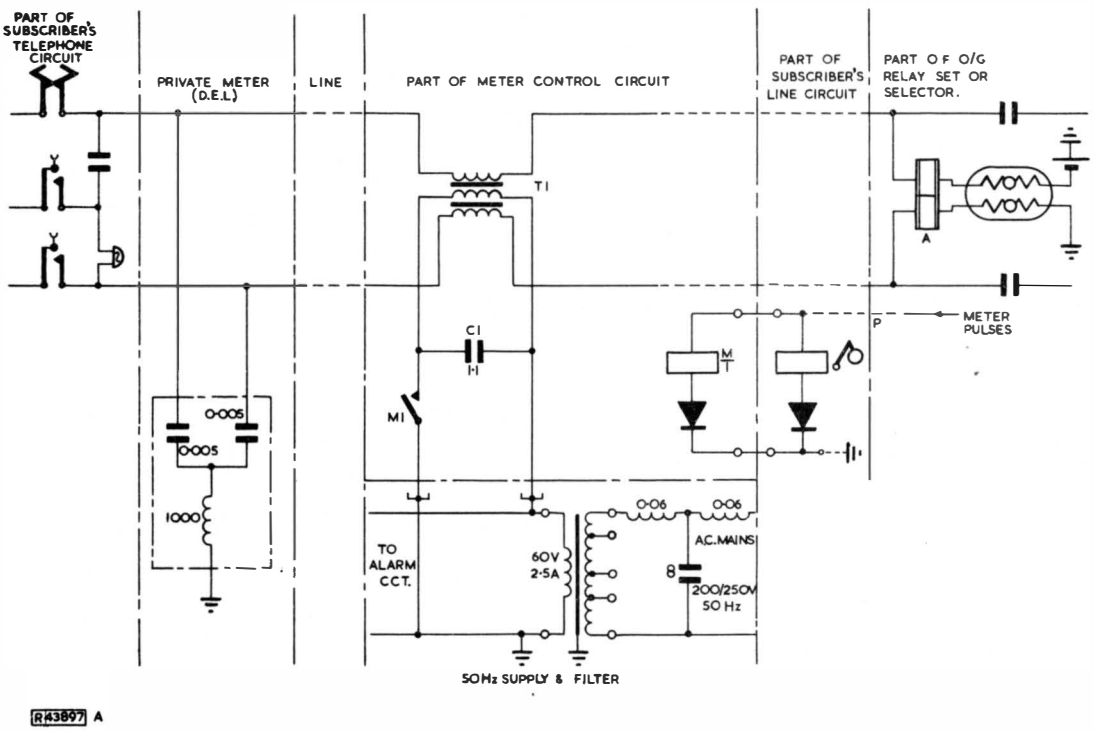


Fig. 12-8 Subscribers' Private Meter Arrangements

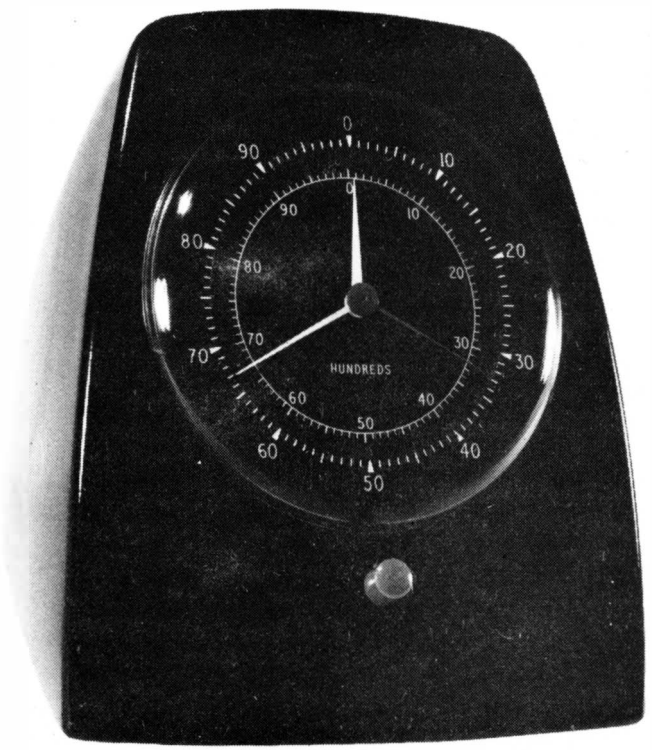


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Fig. 12-9 Subscribers' Private Meter

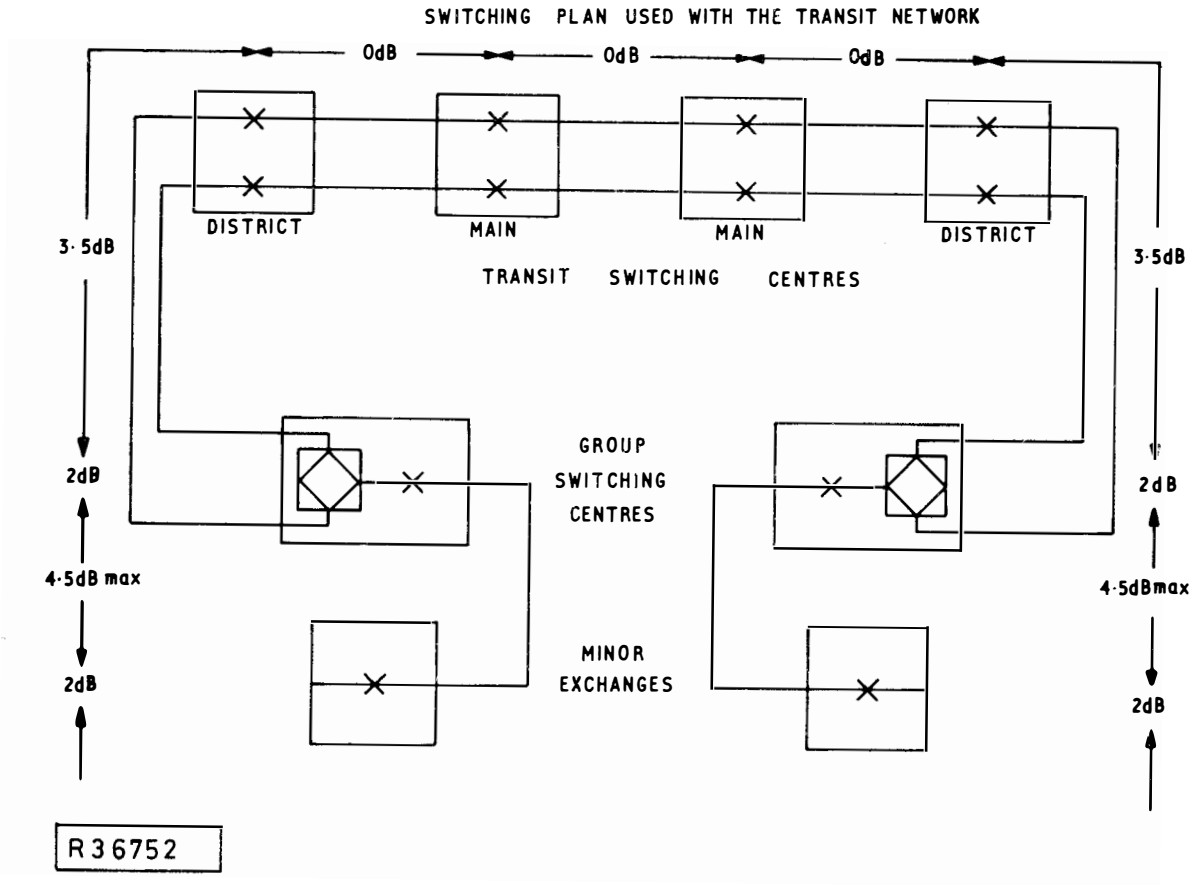

Fig. 13-1 Transmission Plan for Transit Calls

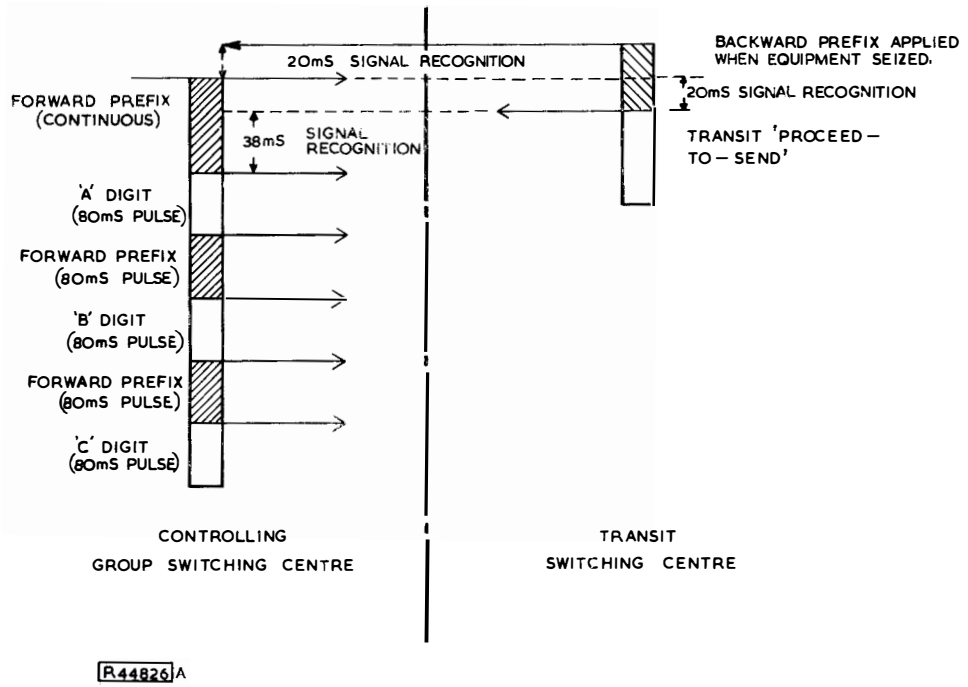

Fig. 13-2 MF 2 Signalling Chart showing the Prefixes and the A B and C digits

FORWARD DIRECTION SIGNALS
(ALL SIGNALS PRECEDED BY FORWARD PREFIX SIGNAL)

SIGNALLING CONDITION	FREQUENCY-Hz					
	1380	1500	1620	1740	1860	1980
DIGIT 1	■	■				
DIGIT 2	■		■			
DIGIT 3		■	■			
DIGIT 4	■			■		
DIGIT 5		■		■		
DIGIT 6			■	■		
DIGIT 7	■				■	
DIGIT 8		■			■	
DIGIT 9			■		■	
DIGIT 10				■	■	
FORWARD PREFIX				■		■
CLASS OF SERVICE						
CLASS OF SERVICE 1 (ORD.)	■		■			
CLASS OF SERVICE 2 (C.C.B.)		■			■	
CLASS OF SERVICE 3 (OP.)		■	■			

BACKWARD DIRECTION SIGNALS
(ALL SIGNALS PRECEDED BY BACKWARD PREFIX)

SIGNALLING CONDITION	FREQUENCY-Hz				
	660	780	900	1020	1140
BACKWARD PREFIX	■		■		
TRANSIT PROCEED-TO-SEND			■	■	
SEND CLASS-OF-SERVICE				■	■
TERMINAL PROCEED-TO-SEND		■			■
CONGESTION		■		■	
CALLED LINE FREE (ORD.)	■				■
CALLED LINE FREE (C.C.B.)	■	■			
CALLED LINE BUSY	■			■	
SPARE CODE			■		■
NUMBER RECEIVED		■	■		

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Fig. 13-3 MF 2 Line Signals

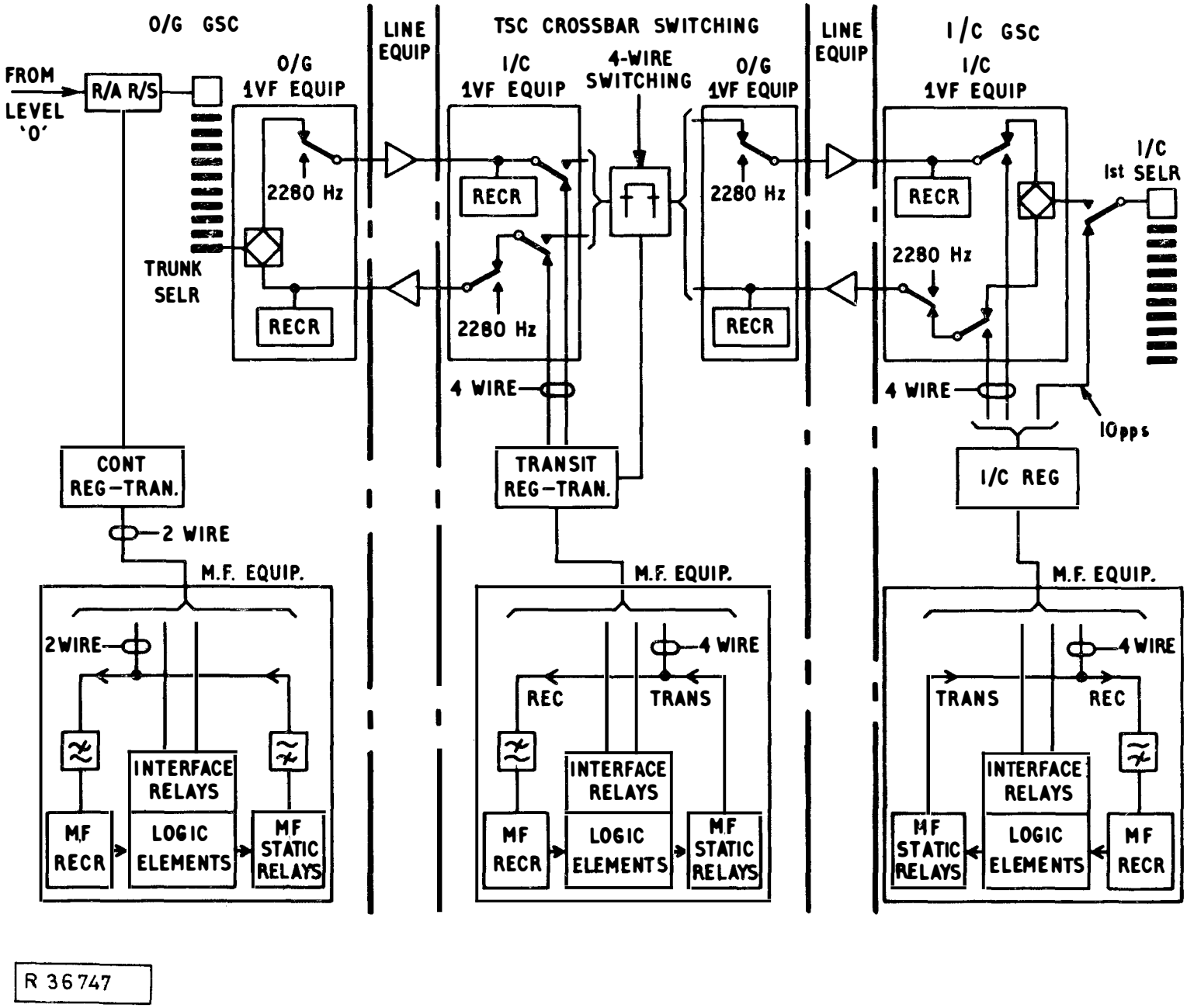

Fig. 13-4 Transit-Network Signalling and Switching

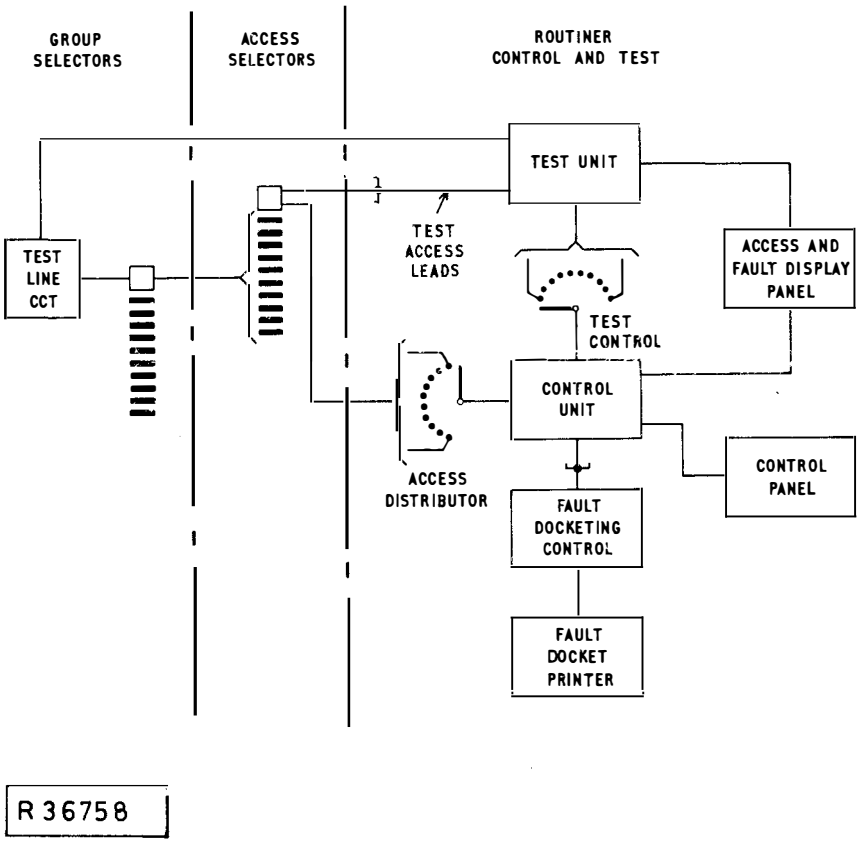

Fig. 14-1 Block Diagram of Automatic Routiner

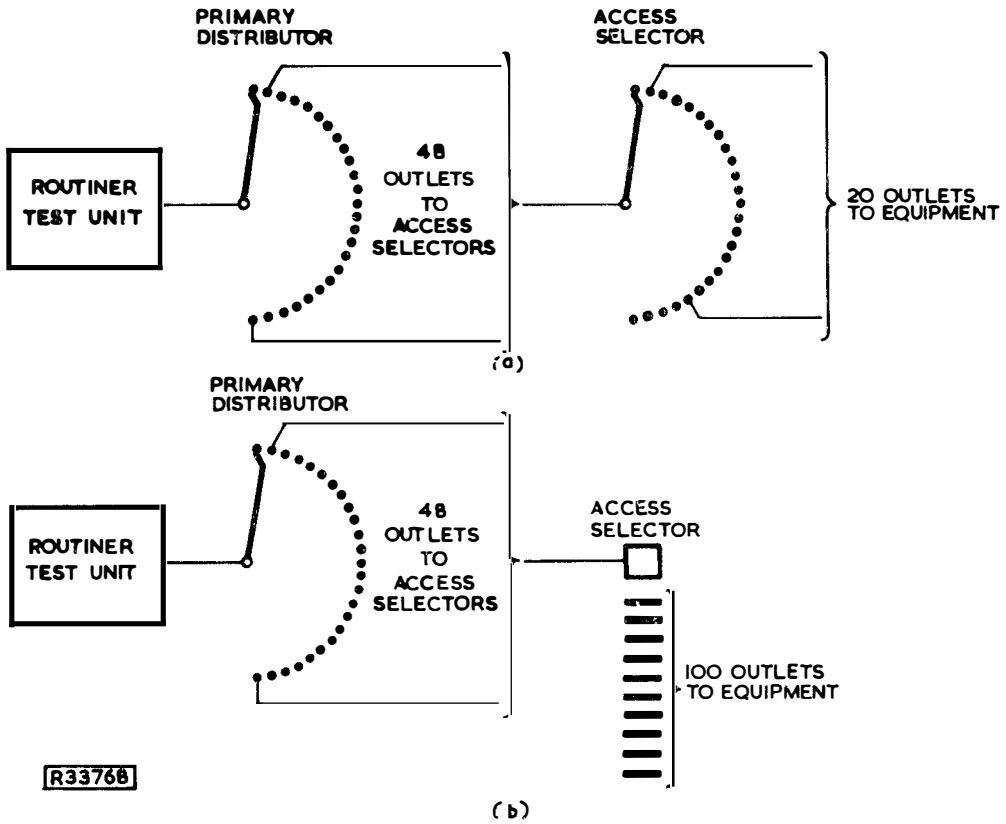

Fig. 14-2 Routiner Access Arrangements

(a) Access to a maximum of 960 circuits

(b) Access to a maximum of 4800 circuits

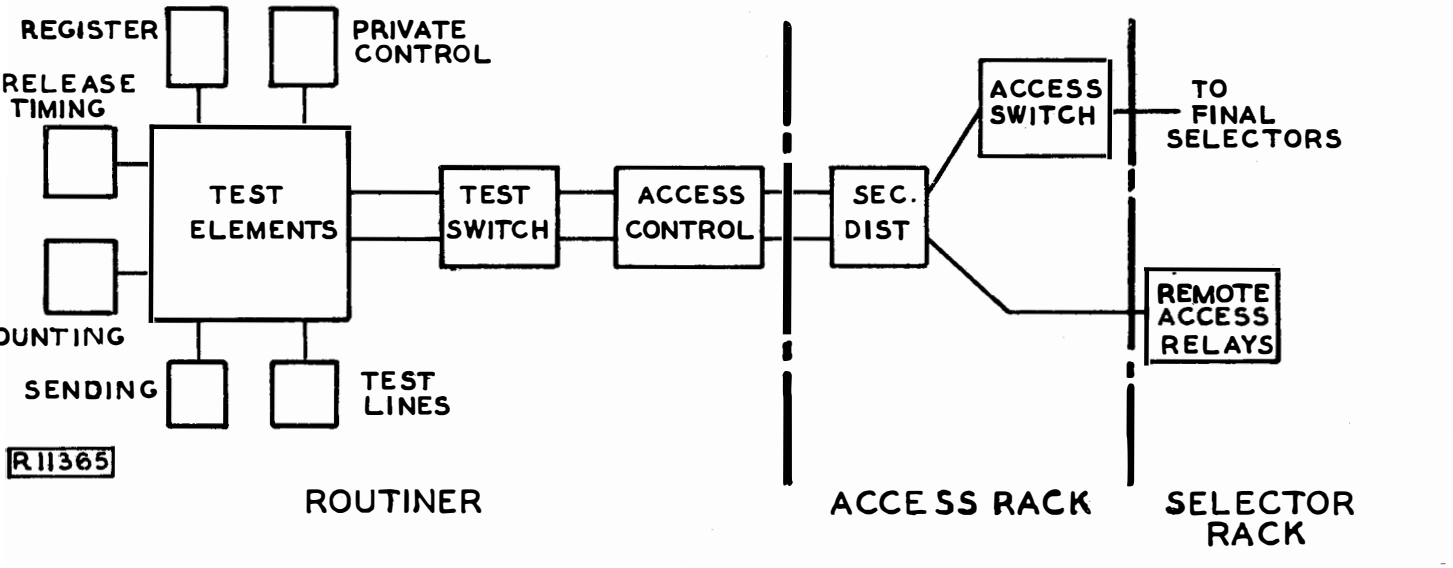

Fig. 14-3 Block diagram of Final Selector Routiner

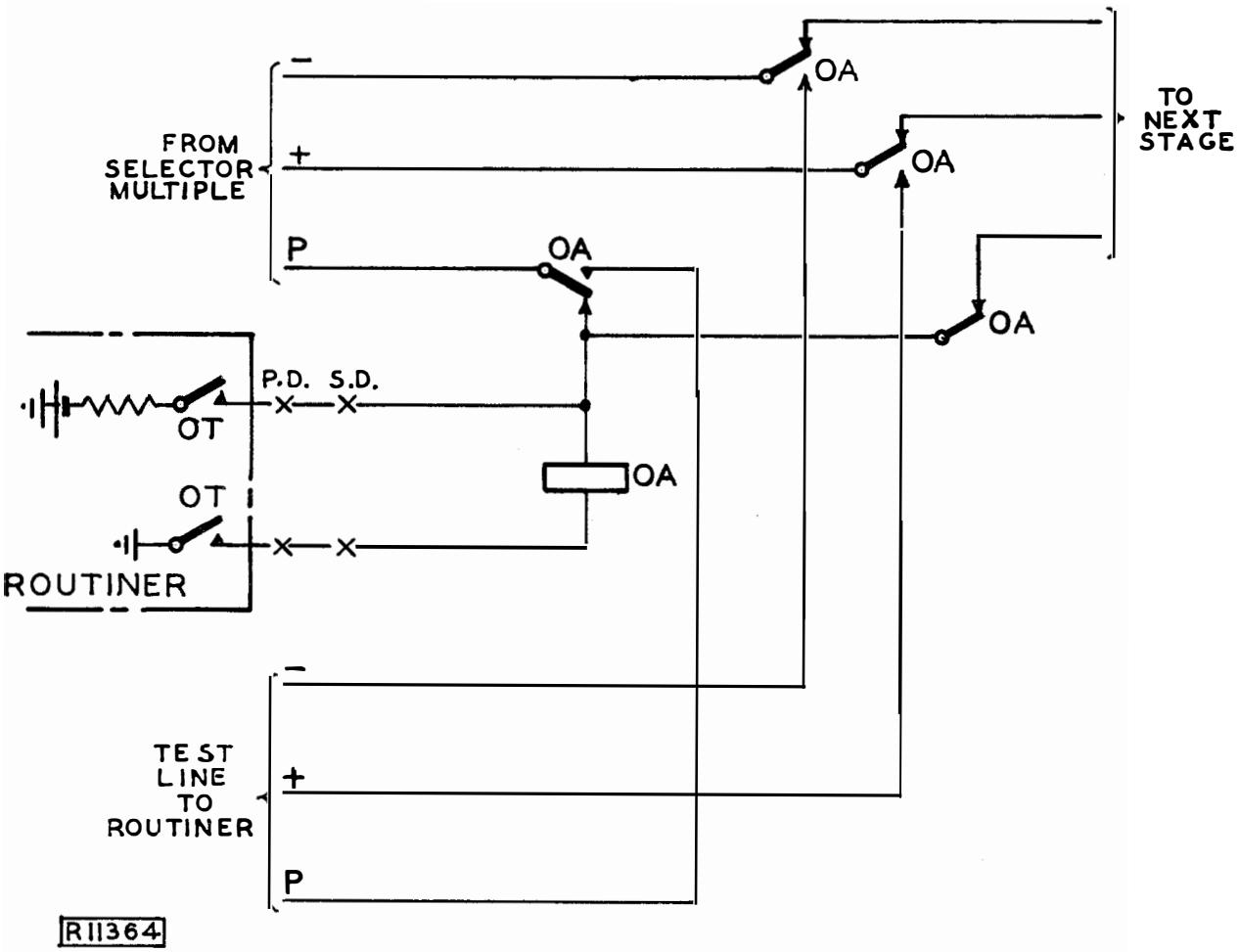

Fig. 14-4 Method of obtaining access to Test Lines of Group Selectors and Final Selectors

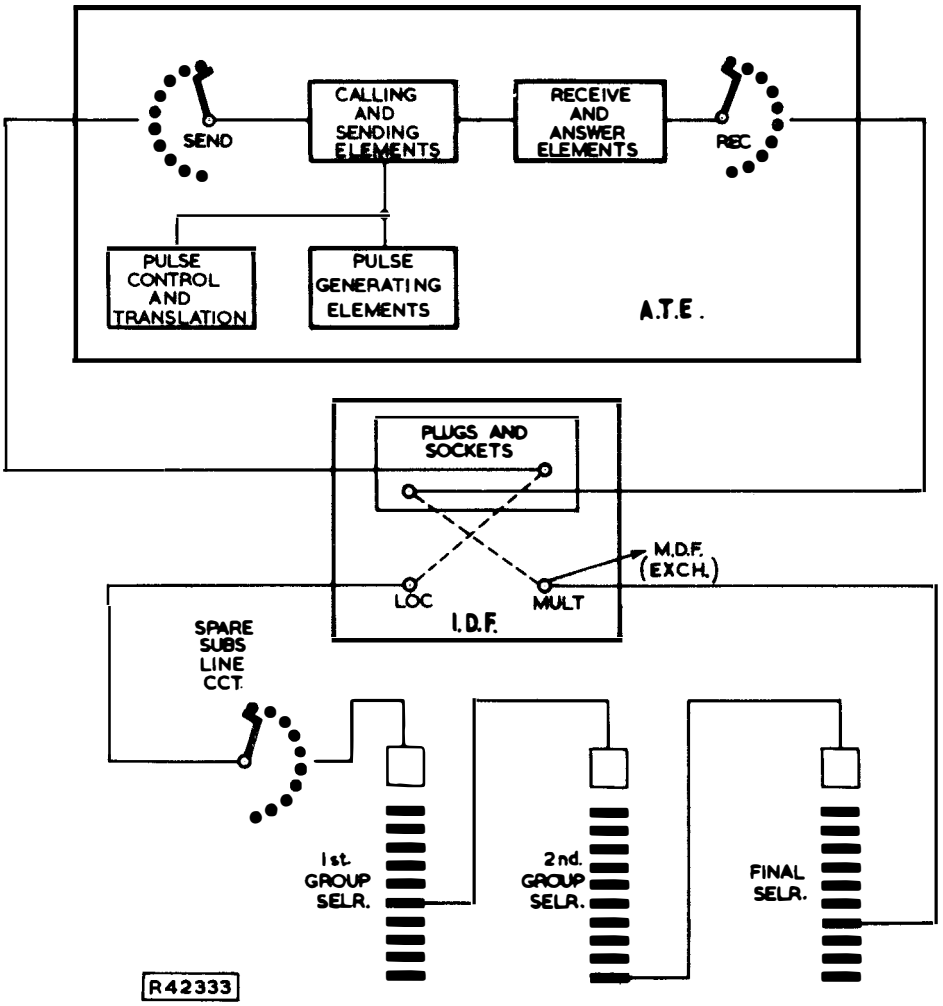

Fig. 14-5 Artificial Traffic Equipment Layout

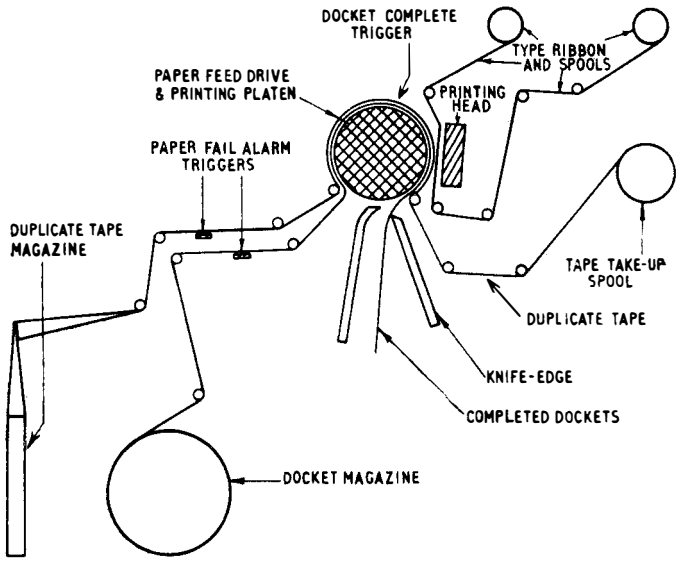

Fig. 14-6 Schematic diagram of Fault Recorder Mechanism

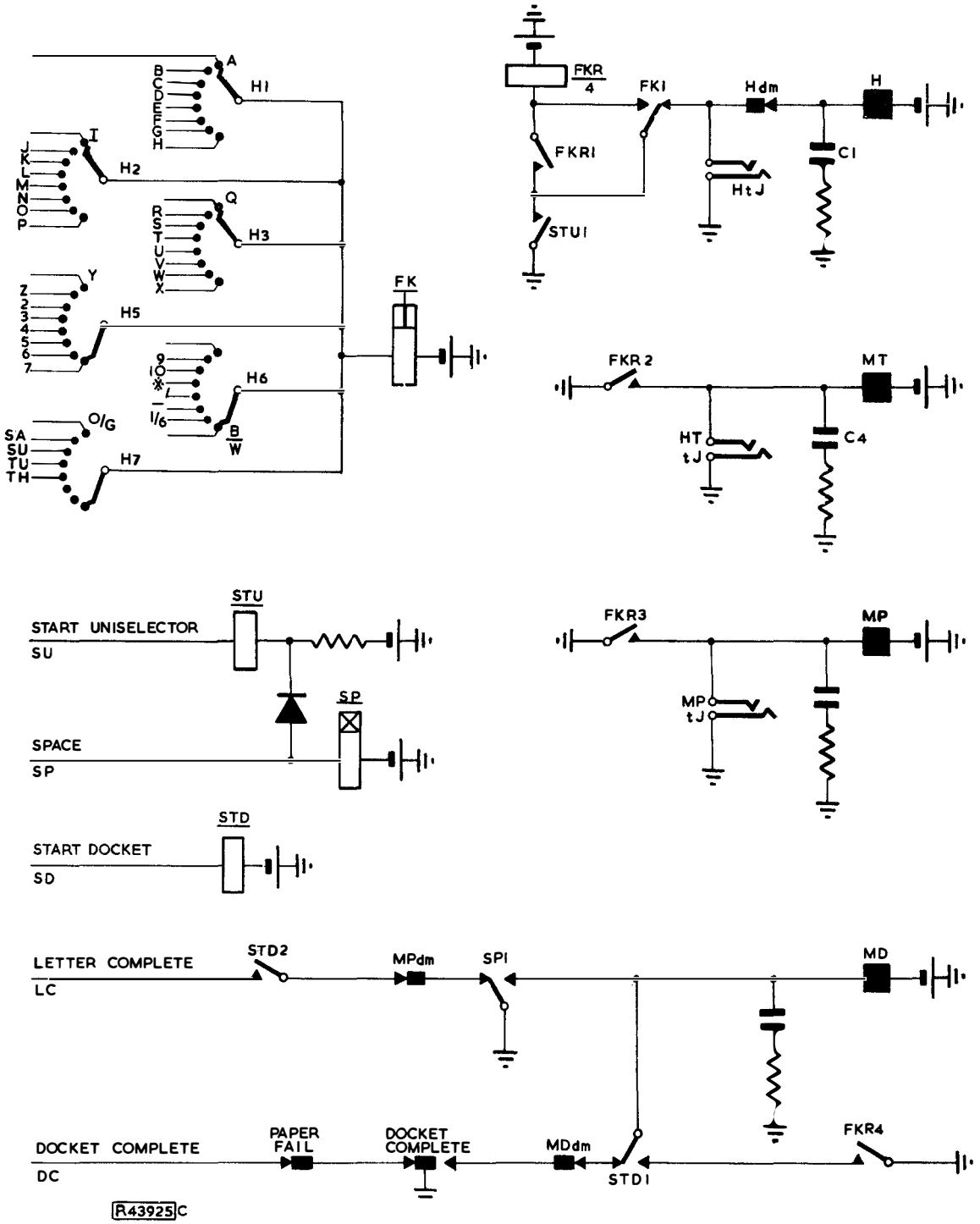

Fig. 14-7 Circuit Diagram of Fault Recorder

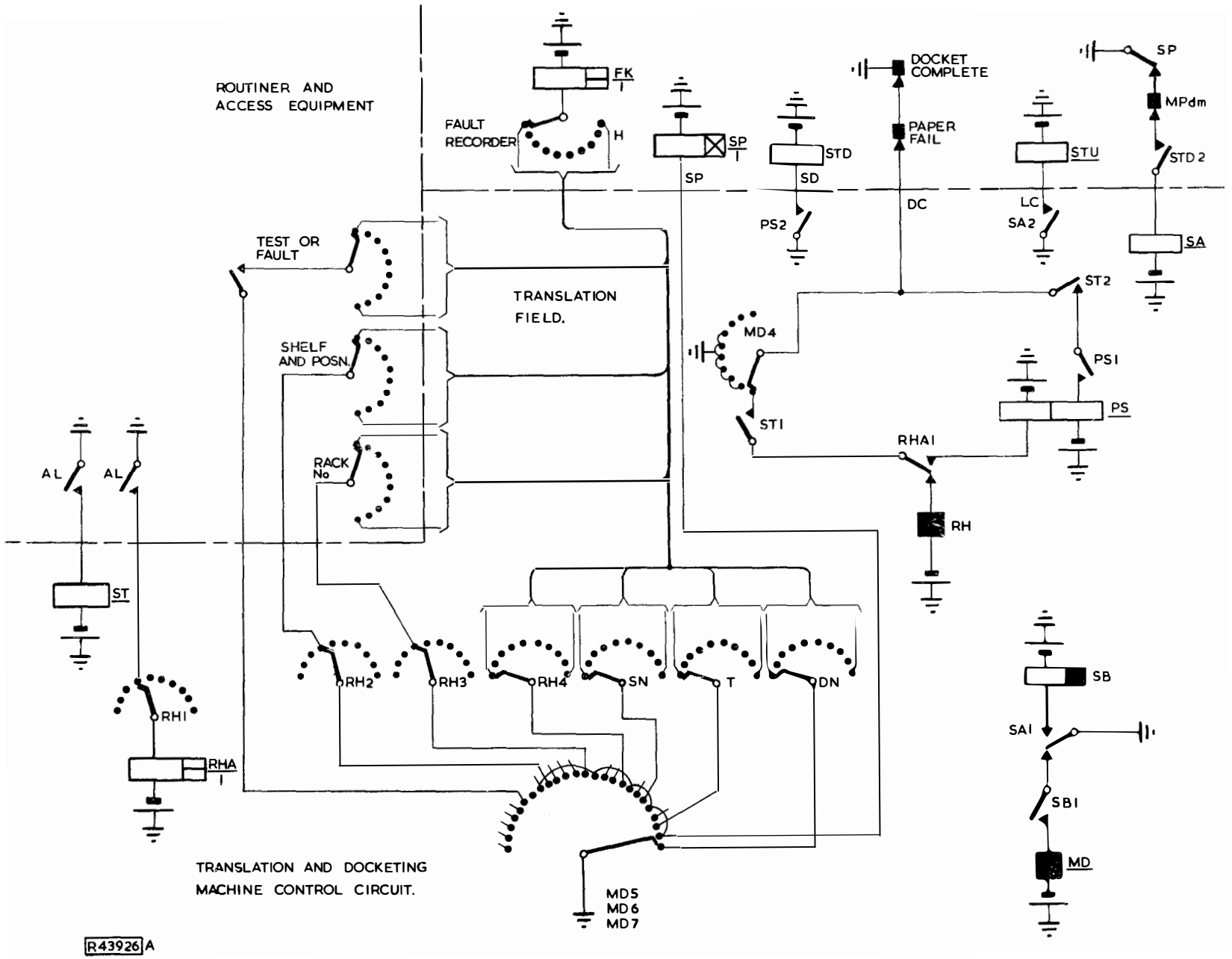

Fig. 14-8 Connexions between Routiner and Fault Recorder