

ISSUE NO. 3

RETYPE  
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EXPLANATION  
OF  
TIMER CIRCUIT  
FOR  
PERMANENTS, CONVERSATION AND TRUNKS  
H-61847

ISSUE #4

This timer circuit consists of two chains of relays, each with a distinct operation cycle, with one chain starting and controlling the other. The Prime Mover group of relays, consisting of relays A, B, C and D controls the timer relay group, which consists of relays G, H, J, K, L, M, N, P, R, S and T.

FEATURES

1. Provides ground pulses required for permanent, conversation and trunk timing.
2. Arranged to supply ground pulses, or to interrupt holding grounds to the various output leads at timed intervals. (Output leads: TR, TR2, TS, TP1, WT, TP4, TP3 and WT2.

OPERATION

This Timer Relay chain is started and controlled by the prime mover chain and is essentially a counting circuit which counts to 32 and repeats.

The attached relay sequence chart of the timer group shows that any group of two associated timer relays requires 2 input pulses to transmit one pulse to the succeeding group of two relays. When two cycles of operation of the first two relays have been completed, (4 input pulses) the succeeding group will have received two pulses, completing its first cycle and it will have transmitted one pulse to its succeeding group of two relays. This sequence will continue through the five timer relay groups.

Therefore, as two input pulses to any group of two timer relays are required for them to transmit one pulse to the succeeding group of two, it may be seen that to obtain a complete cycle of timer operation 32 ( $= 2^5$ ) pulses must be sent from the Prime Mover.

1. Operation of Prime Mover Relays

The Prime Mover cycle is initiated by the operation of relay ST. from ground on lead TONE & TIMER START. Relay ST. operates, closes a circuit to relay B, and grounds lead TONE START. Relay B operates, closes a circuit to C. Relay C operates, grounds lead TIME 1, closes its locking circuit, and closes a multiple circuit to relay D and the Timer Relay group. Relay D operates, removes lead TIME 1 ground, closes a circuit to relay A, and closes a multiple ground to leads TR and TP2. Relay A operates, closes its locking circuit and opens B. Relay B restores, releases its weighted spring which vibrates between contacts 1 and 3, alternately opening and closing a pulse of ground to relays A and C.

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After a few seconds, the vibrating spring will decrease the amplitude of its vibrations enough so that the contact of spring #2 no longer makes sufficient contact with spring #1 to hold C operated. Relay C restores, grounds the lead Time 2, and opens the multiple circuit to relay D and the timer relay group. Relay D restores, removes TR and TP2 lead multiple ground, and opens the circuit for A. Relay A restores, completing the first cycle of operation and closing a circuit to relay B from the ground at the contacts of relay ST. Relay B operates, starting the second cycle of the Prime Mover relays. The timing of the prime mover group may be changed by changing the adjustment of the B relay. Wider spacing of the stationary springs will shorten the time of the prime mover cycle.

## 2. Operation of Timer Relay Chain

The Timer Relay Chain is started and controlled by ground supplied by the contacts of relay C of the Prime Mover relay chain. The cycle of operation of a group of two relays of the timer chain is completed through the application of two ground pulses from the Prime Mover group.

When relay C of the Prime Mover relay group closes the first ground pulse to the first group of two relays (G and N), relay E operates through its #1 winding, preparing a circuit to the shunted #1 winding of relay H. When the ground pulse is removed, the shunt on #1 winding of relay H is removed. Relay H operates through its #1 winding in series with #1 winding of relay G.

Relay H closes the first pulse of ground to relay J of the second group of two relays (J & K). Relay J will operate in a manner similar to that of relay G.

When the Prime Mover relay group closes the second ground pulse, relay H holds operated on its #2 winding, but relay G is energized with its two windings in opposition. Relay G restores, opening both its windings simultaneously, and opening the #1 winding of H. When the second pulse from the Prime Mover chain is removed, relay H restores, opening the first pulse of ground to the second group of the two relays (J & K), and completing the first cycle of operation of the first group of two relays (G and H).

Succeeding pulses from the Prime Mover chain will cause one complete cycle of operation of relays G and H for each two ground pulses, as explained above. Each cycle of operation of the first group of two relays (G and H) will transmit one of the two ground pulses required for a complete operation cycle of the second group of two relays (J and K), and similarly through the five groups of two. (See attached relay sequence chart).

Switching arrangements for the ground interruption on leads TR and TP2 and for the closing of ground pulses on leads TS, TP1, WT, TP4, TP3 and WT3 are interconnected through the various two-relay groups in the Timer Chain to the Prime Mover Chain. The Relay Sequence and time pulse chart, (circuit H-61847) shows the specific periods of grounding, or removal of ground, of the various leads, and the periods of operation of the relays for each of the thirty-two pulse periods in one complete cycle.

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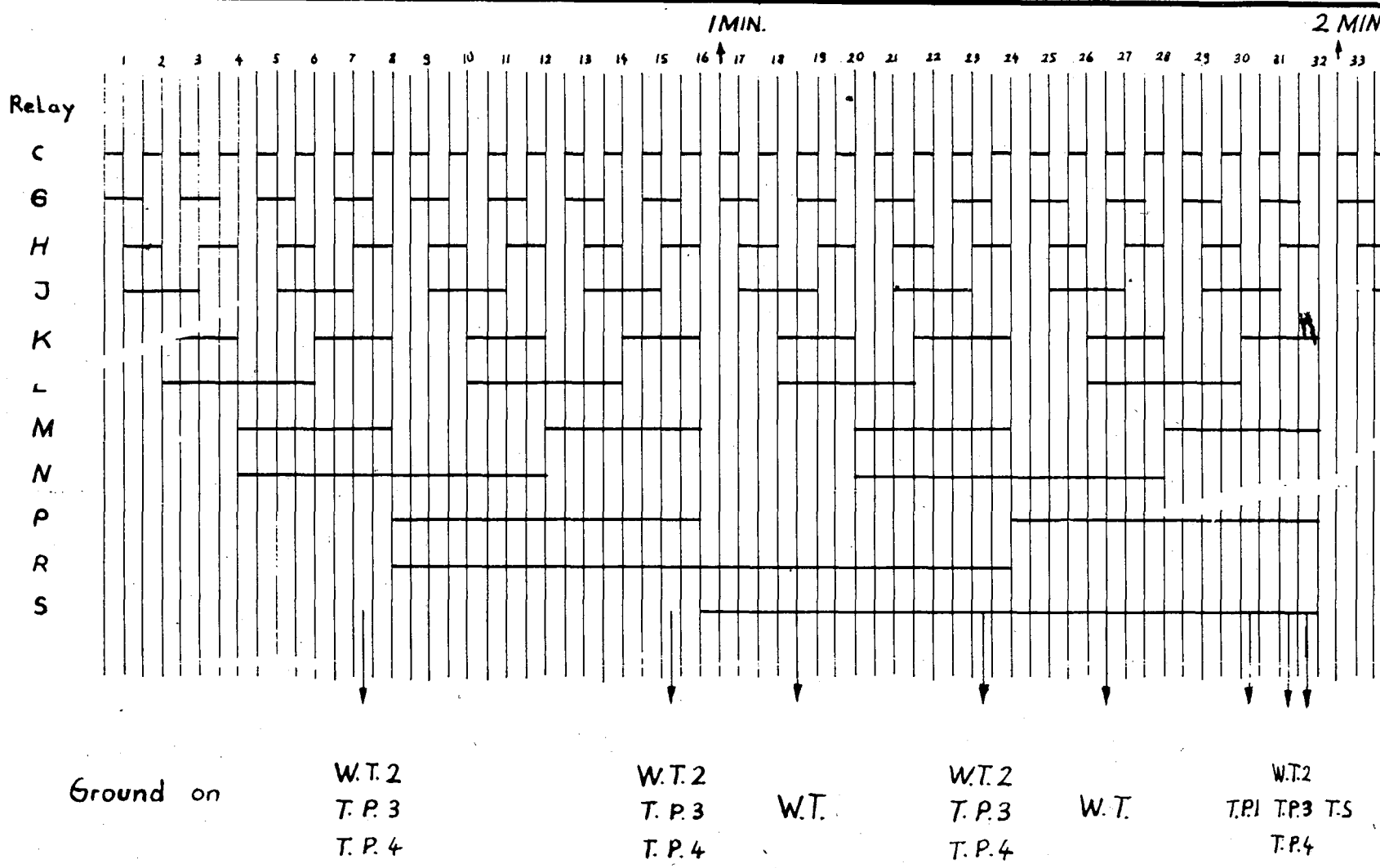
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RELAY SEQUENCE CHART OF RELAY TIMER GROUP IN CIRCUIT H-61847