

1. The secondary sequence diagram, C 47593, shows that the counting train AX, AY, AZ is controlled, during the period when AS is operated, by earths appearing on the "step on" line. The present diagram shows how earths appearing in sequence on three leads switched by AX, AY and AZ control the three steps of the addition or subtraction operation and signal the completion of each step by earthing the "step on" line.
2. The sequence of operations during an addition or subtraction is:
  - (a) the selection of a shift position, normally the straight-through shift B, but other shifts may be introduced by W relay set;
  - (b) the selection of the correct transfer conditions, add or subtract, hold or clear, followed by the operation of the transfer start relay;
  - (c) cancellation of any shift selection condition stored in W relay set and signalling "Order Completed" to the primary sequence.
3. When AS operates, the five order digits are marked out and checked and AX operates. At the same time AA in the subsidiary counter is operated. Earth from AS 2.3 via AZ 2.1 - AX 25.26 - ED 24.23 - break contacts of the subsidiary counter - AA 22.23 - ET 25.26 is applied to a chain of W relay contacts. Normally the W relays are all released and the earth is routed over WA-WJ 25.23 and operates HBX, HBY and HBZ to select shift B. HBX 9.8 forwards the earth over HAX 7.8 - VR 4.3 - VSA 4.3 to the "step on" line. If WA or WC-WJ has been operated by a previous order the earth from ET 26 will be routed to operate the appropriate shift relays. If shift A is selected (relays HAX, etc.) EL is also operated and checked over EL 22.23.
4. The secondary sequence circuit operates AY and releases AX. Earth is extended over AX 2.1 and AY 25.26 to select the transfer conditions. The route ED 4.3 - MPD 1.2 - EN or EP 7.8.9 operated - ENT 5.4 - ET 5.6 exists for every addition or subtraction. EN is operated for subtractions, and FC is operated when the sending store is to be cleared. The alternative conditions are therefore:

- (a) Add and hold. EN and FC normal. Earth extended over EN 22.21 - FC 25.24 - GDN-GMN-GRO-GLA 4.5 - GCA 7.8 - GF 1.2 operates GST.
- (b) Add and clear. EN normal, FC operated. Earth extended over EN 22.21 - FC 25.26 operates GLA, GLB, GLC and GLD (except in the case where the sending address is the lower half of the accumulator when GSM 25.24 bars this operation). GLA 6.5 forwards the earth over GCA 7.8 - GF 1.2 to operate GST.
- (c) Subtract and hold. EN operated and FC normal. Earth extended over EN 22.23 - FC 22.21 - GDP-GMP-GRO-GLA 7.8 - GST 7.6 operates GCB, GCA, GCC and GCD.

These relays pass the complement output from the transfer units to the receiving store. GCA 5.6 prepares to maintain the operating circuit for the GC relays when GST operates. GST 4.5 and GCB 28.29 will provide a hold circuit for the GC relays. GCA 9.8 forwards the earth over GF 1.2 to operate GST.

- (d) Subtract and clear. EN and FC operated. EN 22.23 extends earth over FC 22.23 to operate GLA, GLB, GLC and GLD if GSM is not operated. GLA 9.8 further extends this same earth to operate the GC relays as above, and to operate GST over GCA 9.8.

GST allows the pulse generator to produce a train of numerical pulses. At the end of this train GF operates and the earth is extended over GST 1.2 - GF 2.3 - OPB 2.1 to the "step on" line.

- 5. The secondary sequence circuit now operates AZ and releases AY. Earth from AS 2.3 is extended over AY 2.1 - AL 25.26 - MPD 25.24 - ET 8.9. If any W relay is operated there is a path to operate WB. WB introduces a resistance into the hold circuit of the remaining W relays which release and then in turn release WB. The earth from ET 8.9 is then forwarded over the break contacts of all the W relays to the "Order Completed" line.