

1. This diagram shows typical circuits by which the first digit of a store or the accumulator and the single digit of the translator are connected to the input and driving pulses associated with transfer unit No.1. It also shows how the same digits are connected to the output of the transfer unit and the input of a carry unit as a receiving address. The connections to a register store are also shown.
2. A sending address requires driving pulses for the two dekatron guide electrodes and a connection from the dekatron cathode to the transfer unit input.

The driving pulses for Guide 1 are available at MA⁶ (Pulse Generator) and are switched to the translator by VSB 8.9; to a store by the tens relay SSC 28.29 and a units relay such as SA 2.3; or to the accumulator by GSD 25.26. The pulse generator supplies a train of ten A pulses.

The driving pulses for Guide 2 are derived from the pulse generator (MA 12) when the sending store is not to be cleared (GLA 24.25 normal) or from the complement output of the associated transfer unit when the sending store is to be cleared (GLA 25.26 operated). These pulses are switched to the translator by VSB 5.4; to a store by the tens relay contact (such as SSA 26.27) associated with each vertical row (digit); and to the accumulator by contacts such as GSA 4.5.

3. The output from the translator scaling tube cathode which has been selected by translator input relays (VA-VK or C 47582) is shaped by an output valve and applied to the 1st digit. The store dekatron output cathode is normally connected to the -10 volt line through a rectifier, and to a common output line serving a vertical row of dekatrons in a tens group through another rectifier. The common output line is switched onto the digit busbar by a tens relay contact such as SSA 7.6. Those dekatrons in the nine unselected stores in a selected tens group which are standing at zero make a small contribution to the signal on the output busbar owing to the finite forward resistance of the rectifier which clamps the cathode at -10 V. The output cathodes in the selected store are connected by relay contacts such as SA 25.26 operated to the +20 V line, so that the rectifier limits any positive excursion of the cathode at +20 V. The cathode load of the dekatron is a 2.7 M resistor to -60 volts associated with the transfer unit. A rectifier associated with the transfer unit limits the negative excursion of the dekatron cathode at -10 V. The sending dekatron therefore produces an output waveform which is normally at -10 V and which rises to +20 V when the dekatron discharge is at the output cathode.

The output cathode of the accumulator is limited at +20 volts by a rectifier and connected to the digit busbar by relay contacts such as GSA 21.22.

4. Each transfer unit receives its input from a sending address digit which is determined by the shift relay which has been operated. Normally shift B connects Transfer unit 1 to digit 1, etc. Notice that if a shift other than shift B is in use the complement output from transfer unit 1, which can be applied to sending digit 1, is no longer the complement of digit 1. This makes it impossible to clear the sending store when transferring with a shift other than B.

Contacts such as GDA 24.25.26 allow the transfer units to receive a dummy input for generating the random round off pulses.

5. The input to the transfer unit is applied through a pulse shaping network to the trigger electrode of the cold cathode valve. This is biassed so that the trigger valve is not fired by signals due to pick-up and other digits in the same tens group, but is fired by the 30 volt signal produced when the sending dekatron reaches its output cathode.

Prior to this time the double triode in the transfer unit has its left hand side cut off and is supplied at its cathode with a train of ten B pulses. The negative going pulses appearing at the right hand anode are limited at ± 60 volts by rectifiers and are available for use as the complement on ten of the sending digit. When the trigger valve fires (immediately after the end of a B pulse) the right hand side of the double triode is cut off and the remainder of the train of ten B pulses appear at the left hand anode as the number train.

6. The guide 1 pulses for the receiving address are obtained from the pulse generator (M.A.7) and are a train of nine A pulses, corresponding to the last nine of the train which drives the sending store. These A pulses are switched to the translator scaling tube by VR 9.8, to the accumulator by GRB 28.29 and to a store by GRB 7.8 normal, tens relay SRC 28.29 operated and a units relay such as SAL 3 operated.

The guide 2 pulses for the receiving address are derived from either the number or complement output of the transfer unit, selected by contacts such as GCE 24.25.26 normal for number or operated for complement. The output from the carry unit is in parallel with the selected transfer output, and is limited at ± 60 volts by the rectifiers in the transfer unit. The pulses are switched by contacts such as GRA 5.6 to the accumulator, or over GRA 5.4 and tens relay SRA 26.27 to a vertical row of dekatrons in a storage group, or over VR 7.6 (from digit 8 only) to the translator scaling tube.

The signal from the output cathode of each store digit is similar to that described for the sending store and is routed over a tens relay contact such as SRA 7.6 and GRA 21.22 to the input of the next carry unit, i.e. the output from digit 1 feeds carry unit 0. The output from each accumulator dekatron is switched by contacts such as GRA 22.23. The 2.7 M resistor associated with the carry unit is the cathode load of the dekatron. The cathode waveform is limited at +20 V by the recifier associated with each dekatron and at -10 V by the recifier associated with the carry unit.

The input to the carry unit is passed through a pulse shaping network to the trigger electrode of the cold cathode valve which is fired when the receiving digit reaches zero. When the trigger valve fires the double triode is biassed to pass carry B pulses to the left hand anode at the end of the transfer pulses. Each carry B pulse is followed by an extinguishing pulse at the trigger valve anode.

'During multiplication and division the accumulator receives the numerical trains of pulses from the transfer and carry units with relays GRA, GRB, etc., operated from GMD 3.2 (see C 47588). The store which is selected by the 4th and 5th order digits is then used as a register to hold the multiplier during multiplication or the quotient during division. Contact GRB 7.8.9 disconnects the guide 1 lead of the receiving store from the normal supply of 9 A pulses and connects it to the send store guide 1 pulse supply (10 A pulses).

Contact GCB 24.25 selects a supply of 1 B pulse or 9 B pulses from the pulse generator and routes it over a contact of the selected shift relay, such as HBX 25.26, to the guide 2 electrodes of a vertical row of dekatrons in the tens group of receiving stores. Contacts such as GRA 4.5.6 have diverted the transfer and carry unit B pulse output to the accumulator.

Contacts such as GRA 21.22.23 connect the outputs from the cathodes of the accumulator dekatrons to the input of the carry units. The selected shift relay, such as HBX 28.29 connects the output from one vertical row of dekatrons in the receiving tens group to the pulse generator control circuit. Thus at every transfer one register digit is advanced one step or nine steps (equivalent to one step backwards) until it reaches zero, when a signal is passed to the pulse generator control circuit.