BNL-104483-2014-TECH

AGS/AD/Tech Note No. 49;BNL-104483-2014-IR

EXPERIMENTER TIMING AND INTENSITY INFORMATION

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April 1968

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U.S. Department of Energy

USDOE Office of Science (SC)

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AGS DIVISION TECHNICAL NOTE

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April 16, 1968

EXPERIMENTER'S TIMING AND INTENSITY INFORMATION

Among the many connecting cables linking an experiment to the AGS are a group of coaxial cables, normally five in number, which carry timing and intensity information on each machine pulse.

Information is provided by Main Control as a train of pulses which are sent on a coax cable to the EAO "target desk" where they are multiplexed and sent to individual experiments. In the experimenters control area these cables terminate on a one and one half inch Mylar chassis strip and are labled C_1 through C_5.

C_1 is the 1 KC timing comb which starts at "To" and ends at "Prepulse".

C_2 is the AGS total accelerated or "circulating" beam intensity.

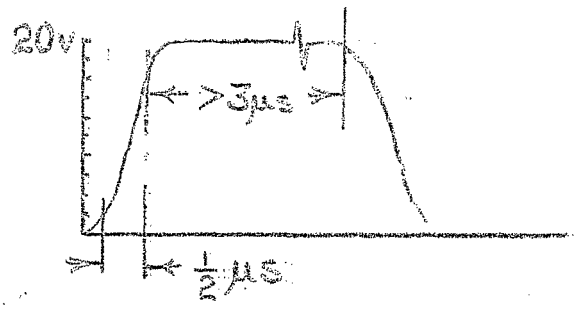
C_3 is the beam due to the particular experimenters target or other extraction device. For example at the 30-in. chamber this would be the F20A target, at Beam 4 this would be either the I10 target or the external beam apparatus.

C_4 and C_5 are often used to send special information from Main Control to an experiment, from an experiment back to Main Control, or from one experiment to another.

The following paragraphs and figures describe these information pulses and their distribution in some detail.

The AGS "Standard Pulse"

All pulses leaving the main control room are 20 volts high with a risetime of 1/2 microsecond and three or more microseconds long. These are "standard AGS" pulses.

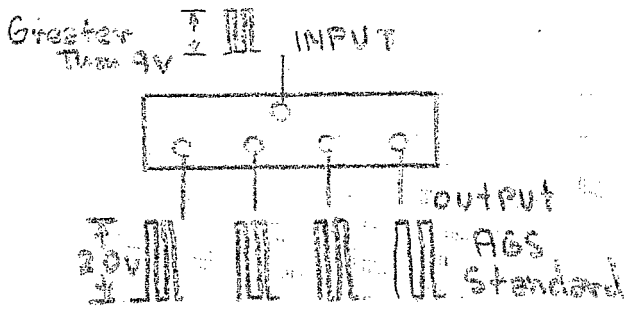


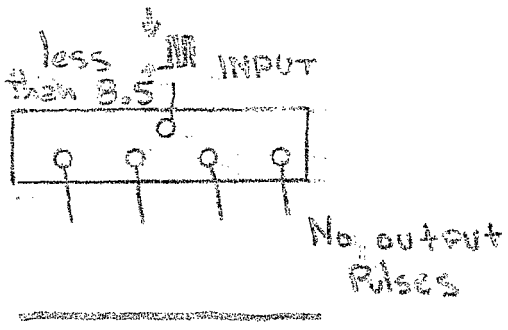
Distribution Coax

The pulses are transmitted on RG-62 coaxial cable which has a characteristic impedance (Zo) of 93Ω. The DC resistance of this cable is approximately 16Ω per 1000 ft.

Multiplex Units

The pulses are often fed into multiplex units which generate a "standard AGS" pulse for each pulse they receive. To prevent pulse generation on noise or electrical pick up these units discriminate against pulses of less than 8.5 volts.

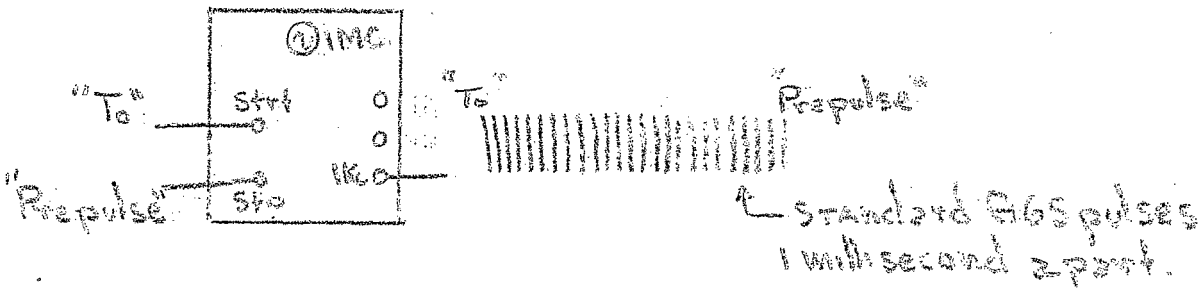




The input impedance of the multiplexing units used at the AGS is 93Ω to match the 93Ω cable impedance. To insure proper counting, the line should always be terminated with a load of approximately 93 ohms.

Timing Comb

1KC timing comb is produced by counting the output pulses of a one megacycle reference. The "master clock" reference is a crystal controlled oscillator and the countdown to produce one timing comb pulse for every thousand reference pulses is gated on at "To" and off at "prepulse". (See first illustration.)



Beam Intensity and Target Spill

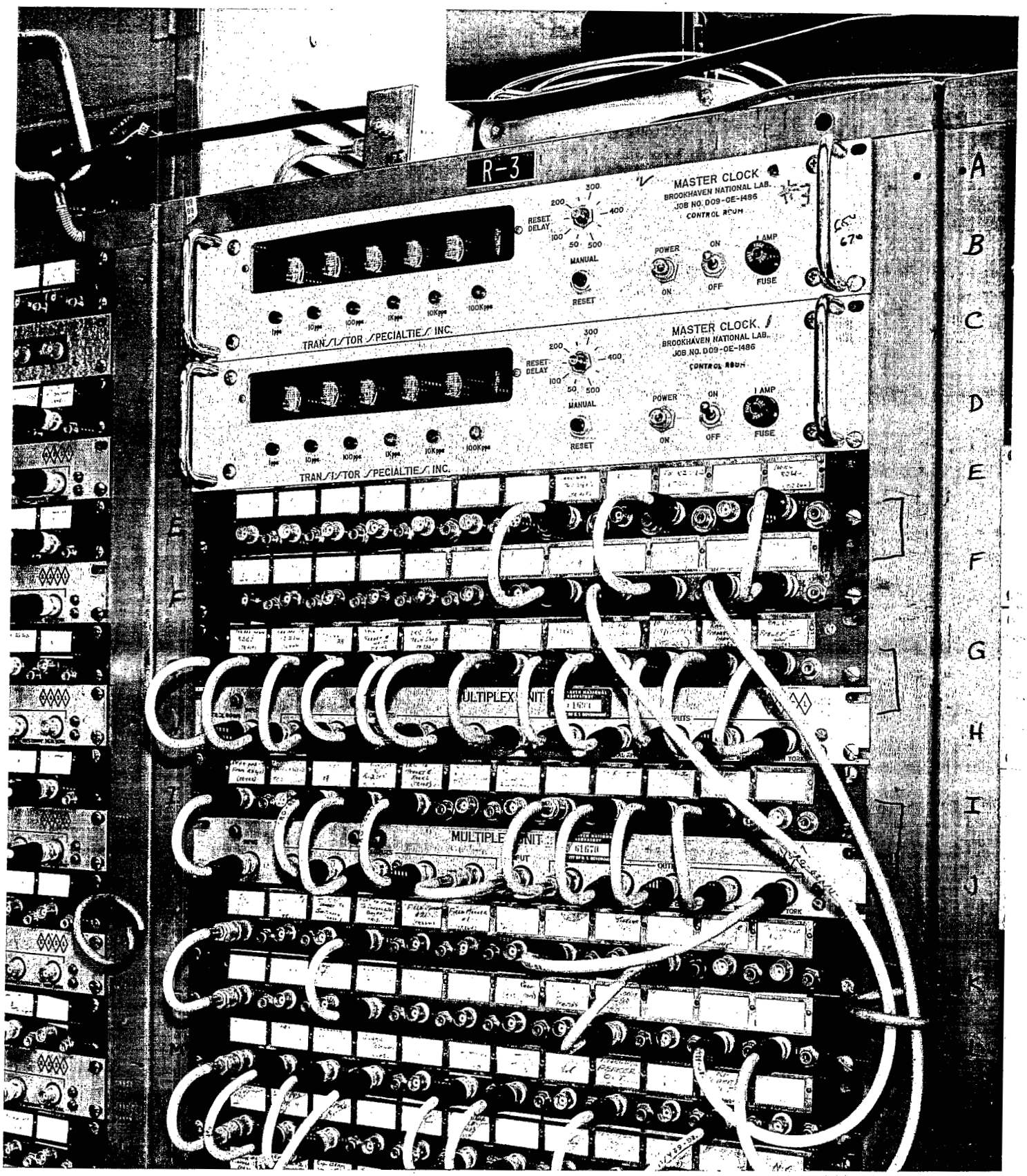
The AC output of a particular set of pick-up or detection electrodes in the AGS ring is converted into a dc voltage proportional to the circulating beam. A train of 50 KC pulses is then generated proportional in length to the dc voltage at a time set in the control room. The times set to generate these trains and how they are handled in the control room determine what the transmitted train represents. At a time corresponding to a machine energy of about 6 BeV normal early losses are past and the train represents the accelerated or circulating beam and is sent out so labled. This train is also stored in a counter and after a target has been radiated a new pulse train is generated and is subtracted on this same counter. The counter reading then represents the AGS beam lost because of the target radiation or "target spill". After a brief delay this counter produces a separate 50 KC train equal to its reading. This last train is labled target spill and sent off on cables appropriate to the particular target. This procedure is repeated for each target

used during the acceleration and flat top portion of the machine cycle.

Distribution

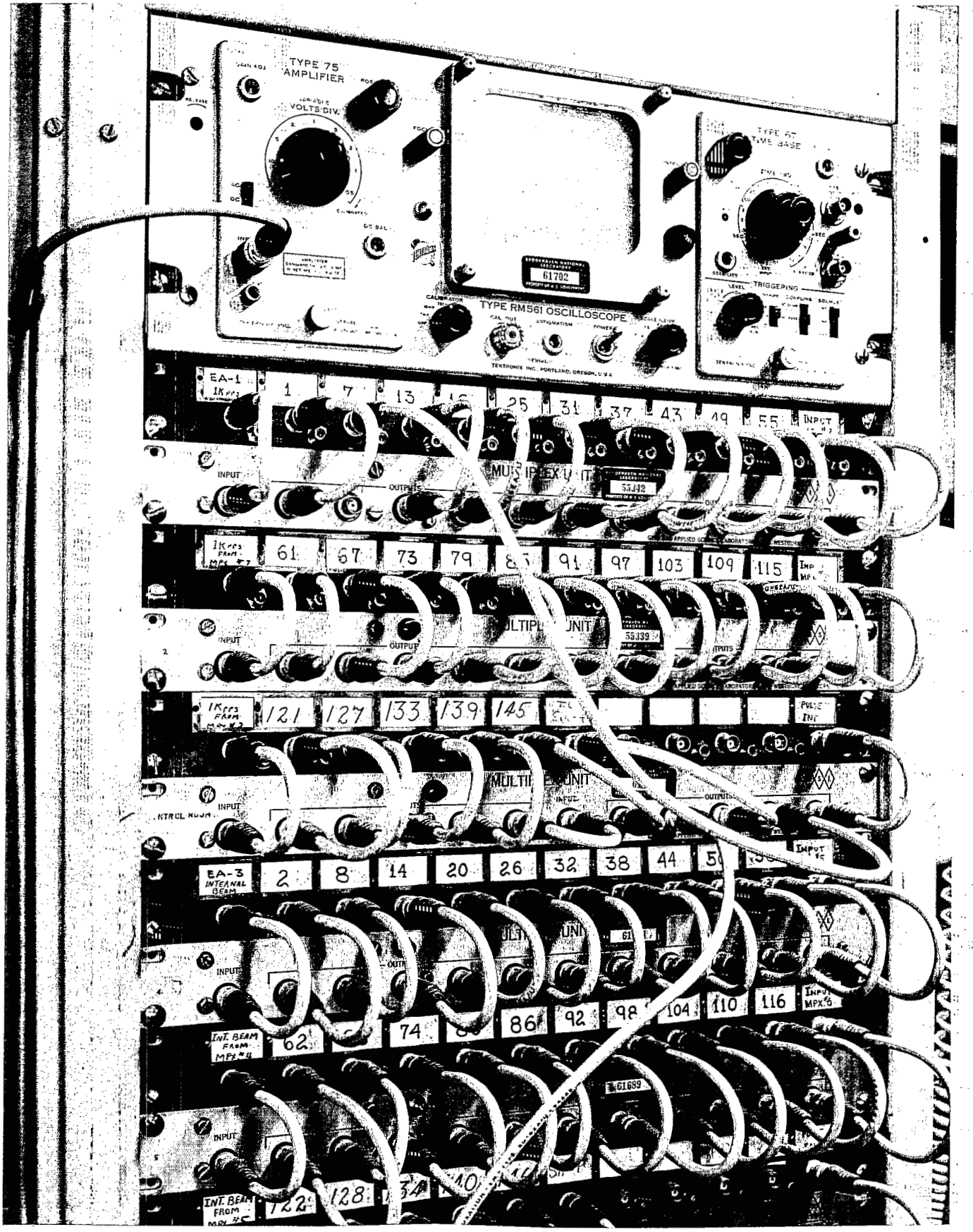
All information pulses are sent directly from the control room to the EA0 target desk on RG-62 coax cables labled EA-1, EA-2,....EA-8.... etc. They terminate on the left hand side of the first EA0 rack and on the lower section of the second. Those signals which must be duplicated are immediately fed into multiplex units located on the first rack. (See second illustration.) The multiplex output pulses are then run into permanently installed, numbered coax interconnecting cables and emerge on the second rack on cables bearing the same number. The pulses now may be conveniently fed into the neighboring groups of five cables, labled C_1, C_2, C_5. Each group of five is identified with a letter A, B, C etc., as can be seen in the illustration. The fourth illustration shows that in the third rack the ends of these lettered groups of cables can be fed into any of the groups of cables marked with EA0 building column numbers. These last cables run to Kassner boxes mounted on the building columns are the last run of the permanent installation. From this point cables are run to individual experiments as needed. A Kassner box is shown in the fifth illustration.

Distr: EA0 Supervisors
EA0 Watch Supervisors
EA0 Liaison Engineers
MCR Technicians
Operations Engineers
E. Forsyth
R. Frankel
J. Grisoli



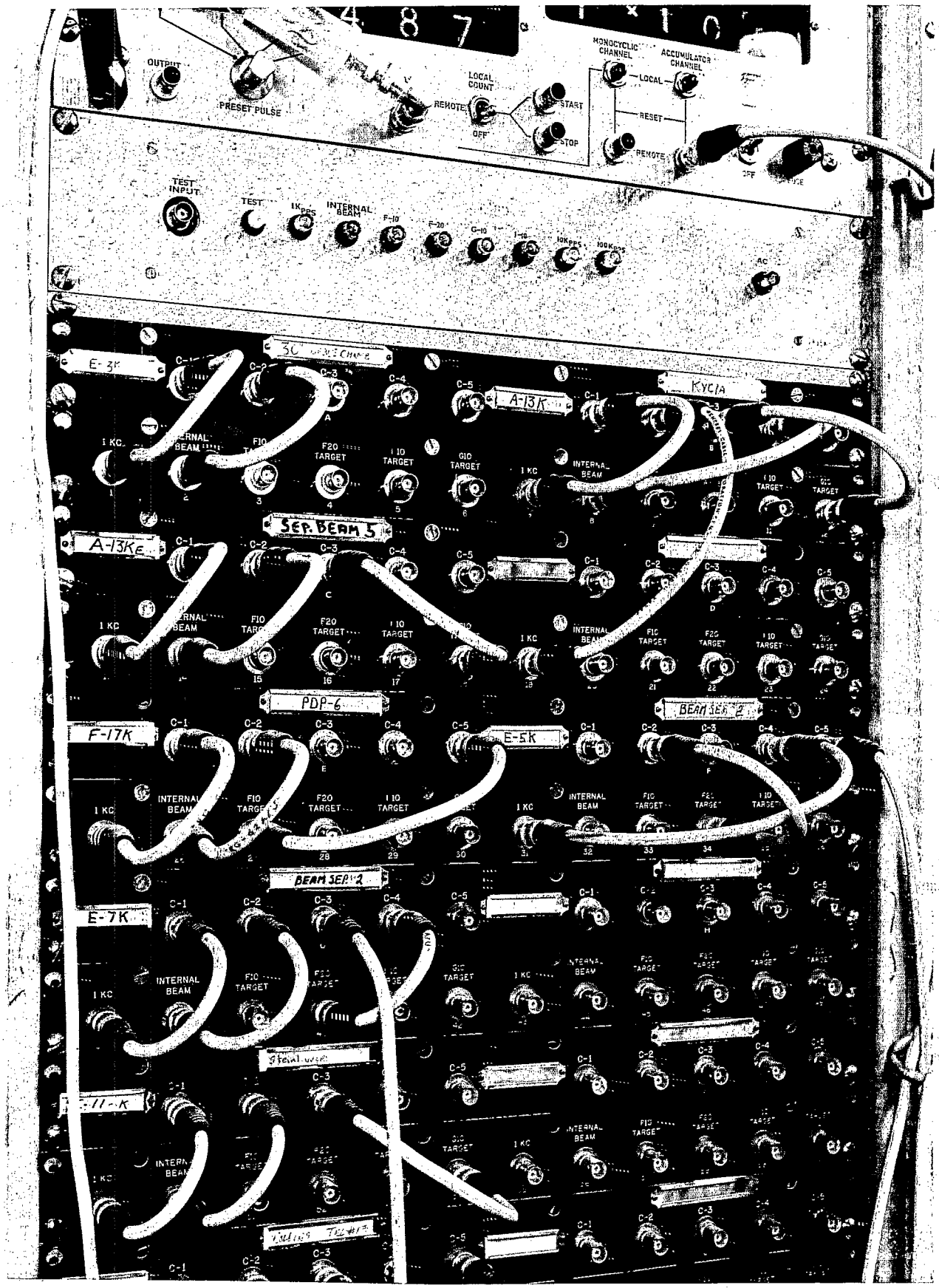
First Illustration

Master clocks of the Main Control Room. One megacycle crystal oscillator runs continuously. The countdown circuits to produce one kilocycle pulses are gated on at "To" and off



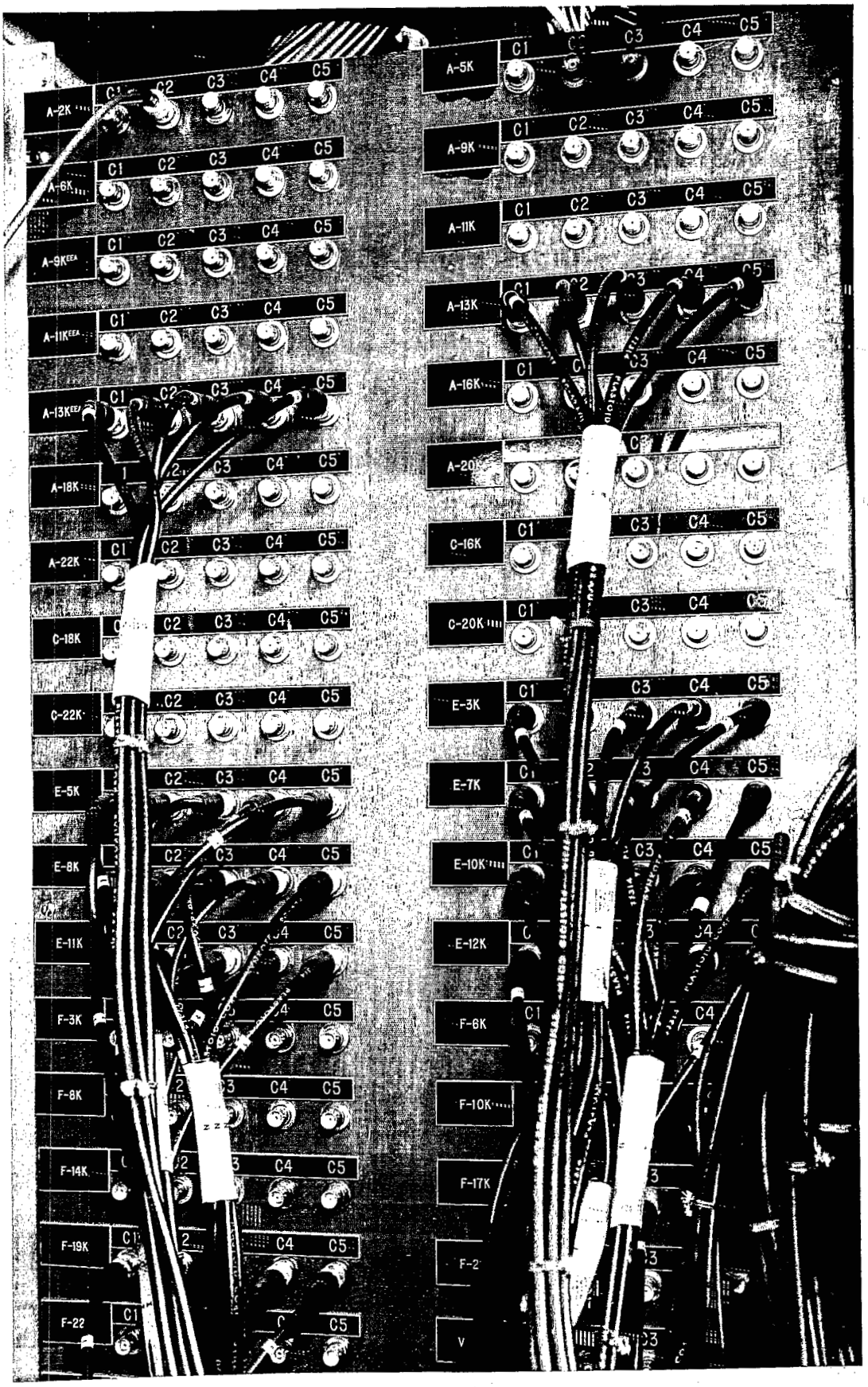
Second Illustration

Multiplex and test units in first target deck rack



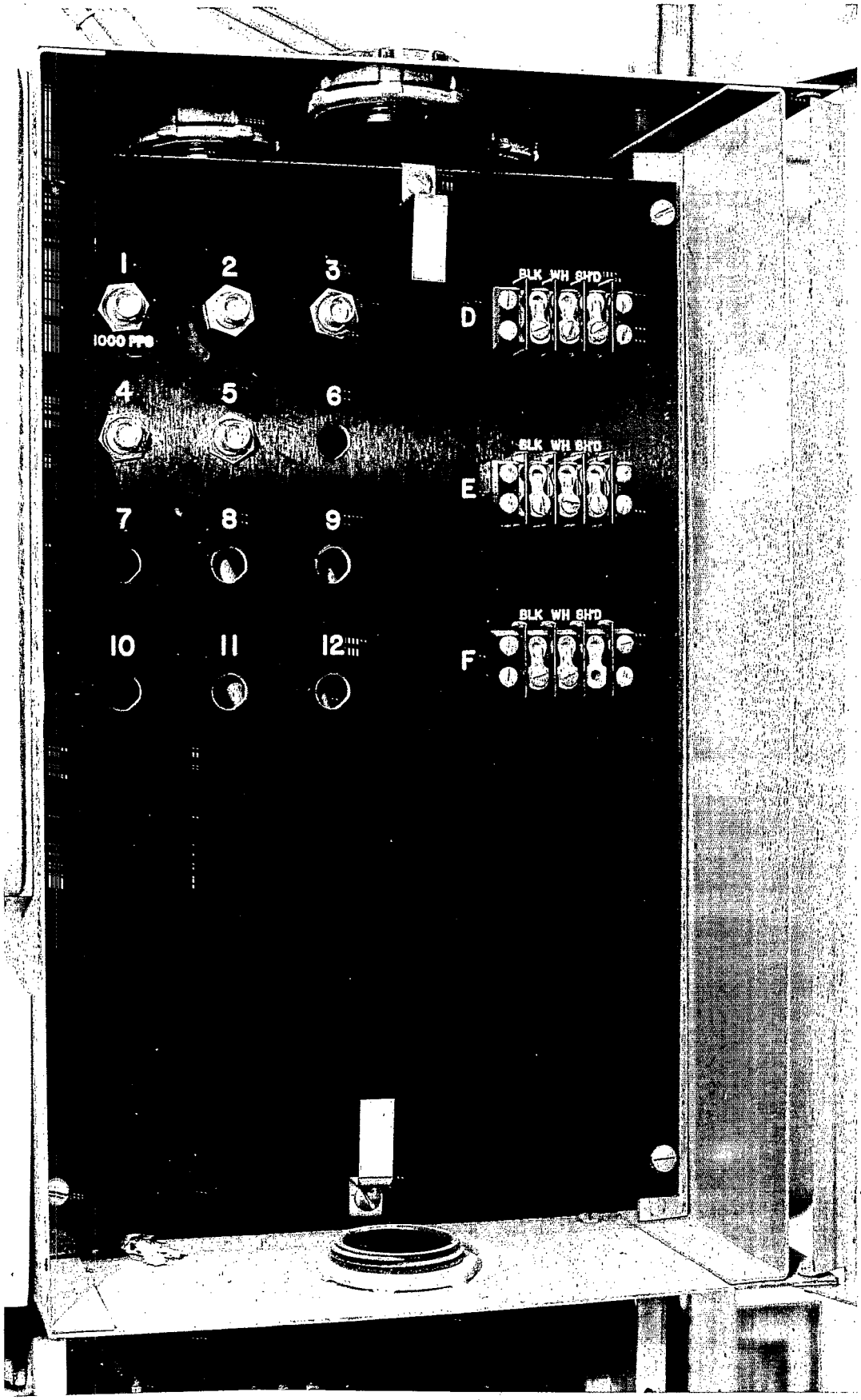
Third Illustration

The second target desk rack



Fourth Illustration

The third target desk rack.



Fifth Illustration

Column mounted "Kassner" box.