B+T SCALER TEST PROGRAM

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See TN-151 and TN-152

Schemes : 370-105-2 circuit 370-904
370-106-1 " 370-905
370-107-2 " 370-906
370-108-1 unit cabling
370-208-1 " "

1. NECESSARY INSTRUMENTS

- Stabilized power supply + 5 V dc (~ 2A);
- Stabilized power supply + 24 V dc (~2,5 A);
- Stabilized power supply + 250 V dc (~ 50 mA);
- Counter (min 1,5 MHz) with the START-STOP arrangement;
- Oscilloscope (min 10 MHz);
- Remote control unit with the connection cables;
- Assembled crate for the B+T scalers;
- Ejection pulse generator unit;
- Assembled crate for the kick parameter selector;
- Simulator of the accelerator timing pulses;
- 6L extension for the B+T scaler with the connection cable.
- Multimeter

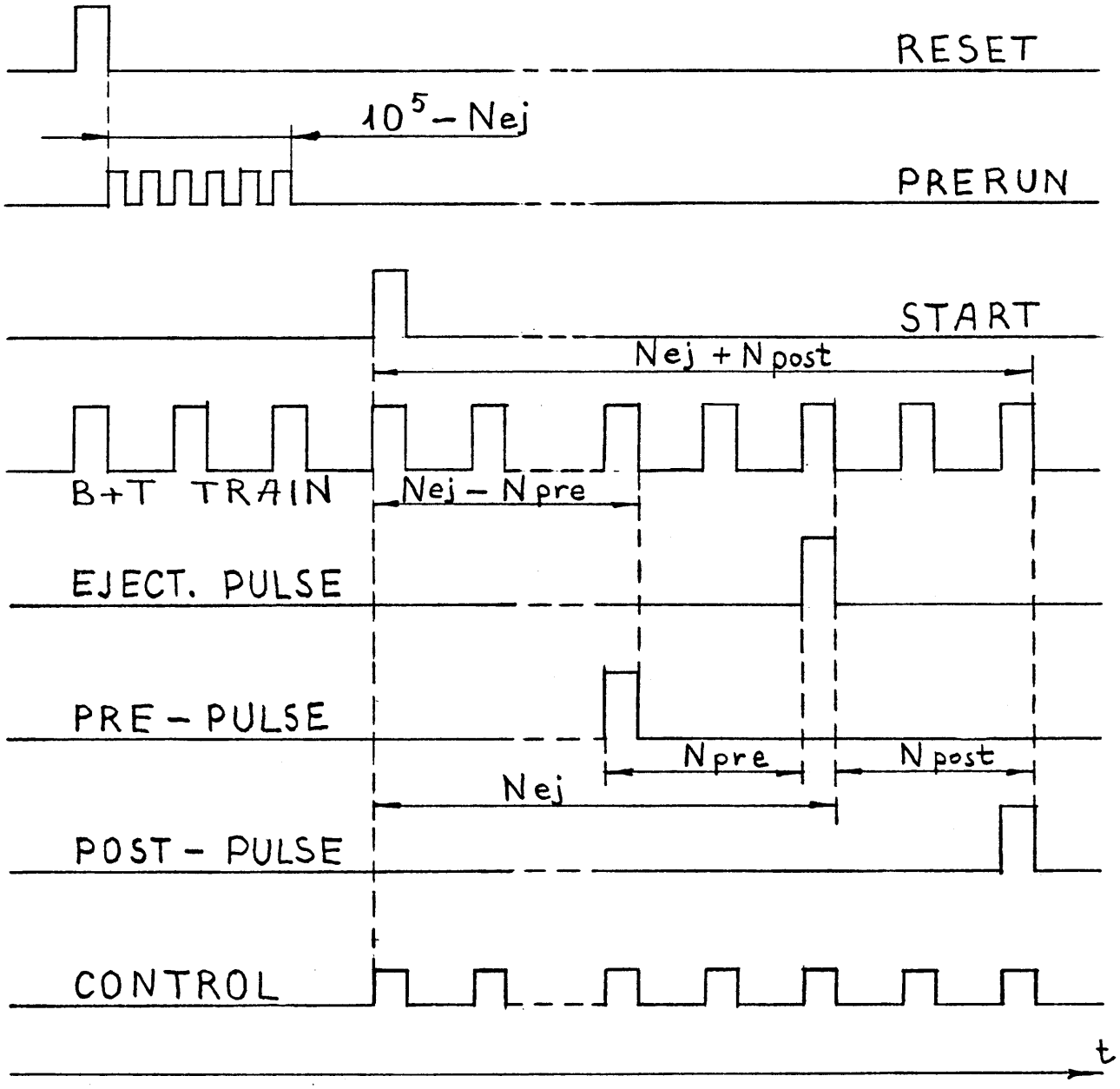
2. OPERATIONAL SIGNALS

2.1 Pulse definition

pulse title		connector contact	parameters	function
PRE mode	POST mode			
RESET	RESET	3	+20V/1µs	Reset of the counter, the flip-flop 19 and the flip-flop 20.
Prerun		6(↗7)	+4V prr≃1,5MHz duty cycle ~ 50°/o	Pre-scaler preset in accordance with a number $10^5 - N_{ej}$, where N_{ej} is the ejection pulse index set at the K.P. selector.
START		2	+ 20V/1µs	Set of the flip-flop 19 preparing the gate 16 for a subsequent coincidence, and the flip-flop 20 which initiates the B+T pulse count by means of the gate 21.
	EJECTION PULSE	5	+ 20V/1µs	The same as for the START pulse.
B+T train	B+T train	4	+20V/1µs	Count pulses, applied to the scaler input and to the output coincidence gate 16.
PRE pulse	POST pulse	8(↗9)* 10(↗11)* 13(↗14)* 15(↗16) 17(↗18) 19(↗20)	+20V/1µs	Output pulse corresponding to the preselected B+T pulse.
Control	Control	12	-4V/1µs versus +4V offset	Auxiliary output of the gated B+T train.

Note : (*) The remote controlled PRE/POST scaler has only three outputs, for which the contacts (marked with an asterisk) of the connector 1 are used.

2.2 Pulse sequence



2.3 PROGRAM and INHIBIT conditions

If the PROGRAM and INHIBIT switches are on the positions PERM. and OFF, the PRE/POST pulse emission does not depend on the PROGRAM and INHIBIT input conditions. When the switch positions are PROGR. and ON, shorting of either input (connector contacts 1 or 21,22,23,25,28, 29 which correspond to the six PRE/POST pulse outputs) inhibits the PRE/POST pulse emission.

2.4 Test report

The units must be numbered. The general test report indicates for each unit :

the anomalies determined;
the replaced components;
the +5V and +24 V power supply consumption.

All printed circuits equipped with their components must pass the thermal cycle under a temperature of ~ +60°C before the assembling. The parameters of the cycle are indicated at the test report.

TEST PROGRAM

3.1 Check visually the assembling of the printed circuits and the cabling of the unit.

3.2 Check the position of the PRE/POST bridges which must correspond to the unit mode.

3.3 Check the correct assembling of the preselectors which must be of type M052 for PRE scaler and M031 for POST scaler.

3.4 Connect the units with the +5V and +24V power supplies (the remote controlled units with the +250 V as well). Measure the consumed current, which has to be :

B+T scaler type	consumption		
	+5V	+24V	+250V
ordinary unit	~1A	~1.5A	-
remote controlled unit	~1A	~1.1A	~40 mA

3.5 Display (remote controlled units)

Check the conformity of the display with all positions of the preselectors by means of the remote control unit :

Decade 10^0 positions 0 to 9
" 10^1 " 0 to 9

" 10^4 " 0 to 9

In all 50 positions per unit.

3.6 Reset

Check the RESET pulse shape at point 5 of the card 370-906 (+4V/1µs). After the RESET pulse has occurred, check the presence of the logical 0 voltage at the following points :

a) the counter decade outputs (card 370-906)

39,40,38,37	of decade	10^0
21,24,23,22	" "	10^1
27,26,25,28	" "	10^2
32,31,30,29	" "	10^3
36,34,35,33	" "	10^4

b) the output Q of the flip-flop 20 (card 370-906)

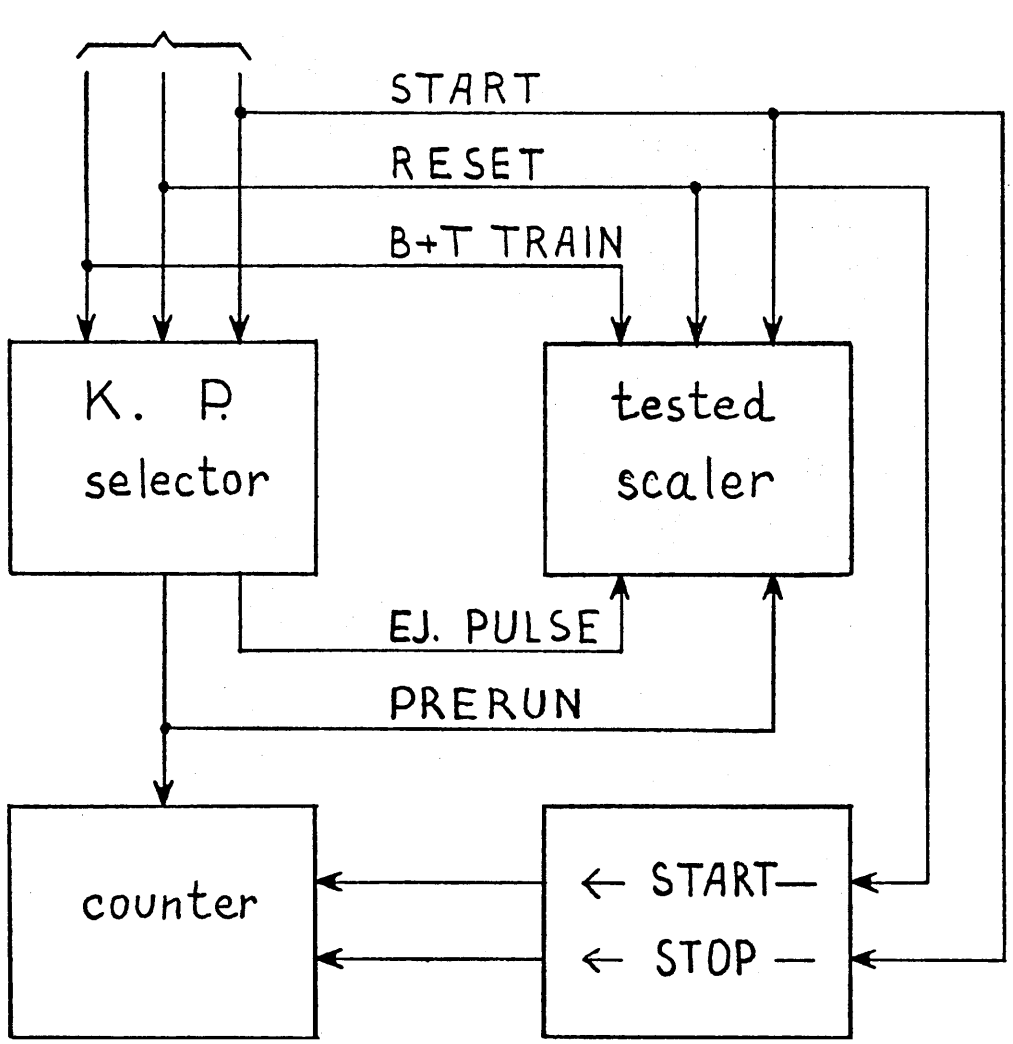
c) the output Q of the flip-flop 19 (card 370-904)

3.7 Prerun (PRE mode)

Check the train parameters at point 7 (⊁11) of the card 370-906 :

prr ~ 1.5 MHz
amplitude +4V
duty cycle ~50%.

Measure the number of the prerun pulses by means of the enclosed scheme.



After the PRERUN train has occurred, check the logical states of the counter decade outputs (see previous item), which must correspond to the number of the prerun pulses.

3.8 START (PRE mode) or EJ. PULSE (POST mode)

Check the START (EJ) pulse shape at point 4 of the card 370-906 (+4V/1μs). After the START (EJ) pulse has occurred, check the presence of the logical 1 voltage at the outputs Q of the flip-flops 20 and 19.

3.9 B+T TRAIN

Check the B+T train parameters at point 6 of the card 370-906:

prr	10 KHz
amplitude	+ 4 V
pulse duration	~ 1 μs

3.10 Check the coincidence pulse shape at the input of the blocking oscillator BO (point 9) which has to be -4V/1μs with respect to + 4V offset.

3.11 Check the parameters of the PRE/POST preselected pulse at the coaxial connector BNC 75Ω :

amplitude	+ 20 V
pulse duration	1 μs

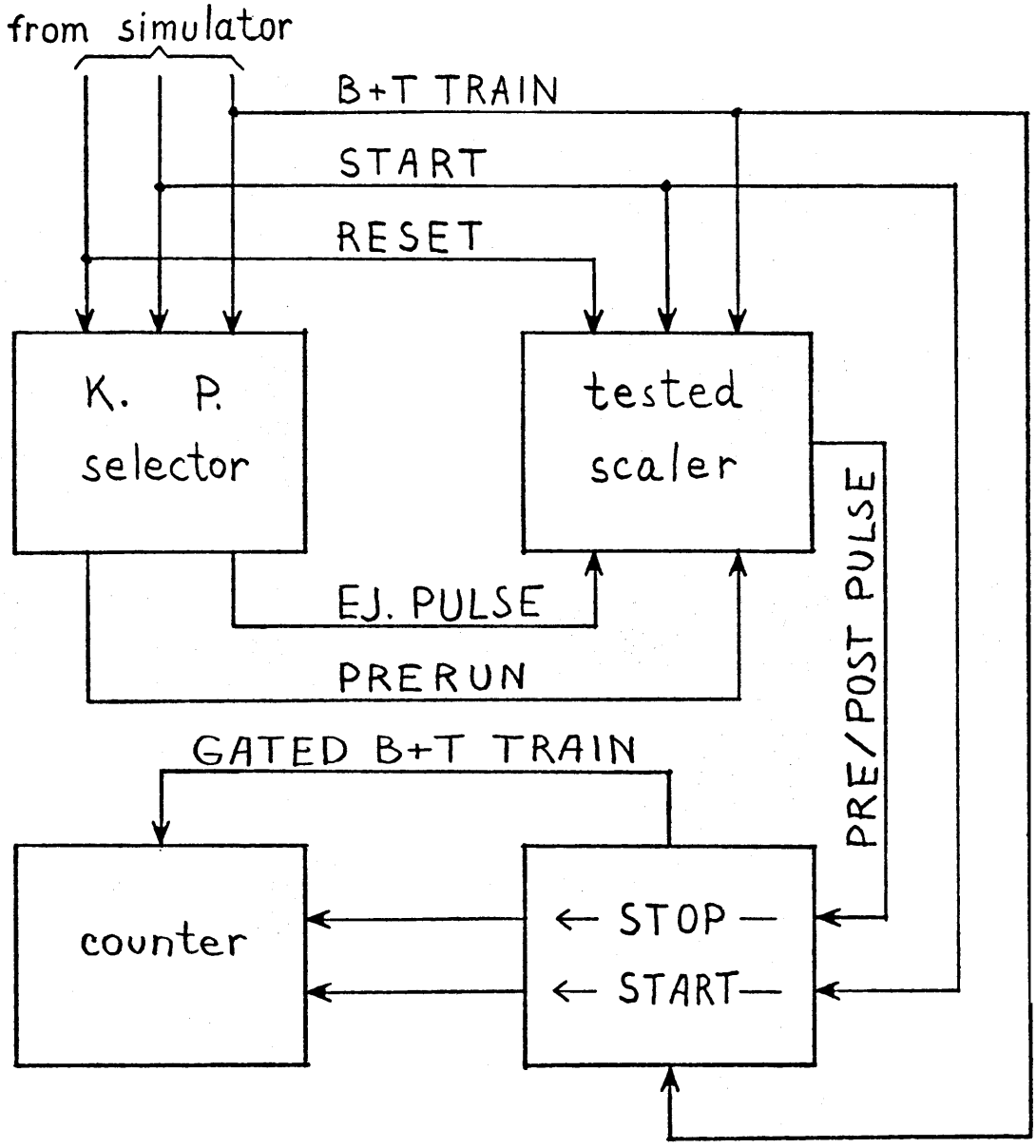
The indicator lamp flash is about 100 ms.

3.12 Check the function of the PROGRAM and INHIBIT inputs in accordance with item 2.3.

3.13 Check the operation of the flip-flop 19. After the coincidence pulse has occurred, the output Q must have the logical 0 voltage.

3.14 Check the operation of the flip-flop 20. After the counter overflow (10^5 pulses) has occurred, the output Q must have a logical 0 voltage.

3.15 Check the selection of the pulses from the B+T train by means of the enclosed measurement scheme.



for the following positions of the preselectors :

0 to 9	decade 10^0
0 to 9	" 10^1
0 to 9	decade 10^4

(in all 50 measurements per unit)

The counter readout must correspond to the figure :

$N_{ej} - N_{pre}$ for PRE mode

$N_{ej} + N_{post}$ for POST mode.

where N_{ej} - ejection pulse index set at the K.P. selector.

Npre/post - pre/post pulse index set at the pre/post scaler preselector.