

[[NB11-001]]

11
10/9/52 to 10/11/52

[[NB11-002]]

[[diagram]]

Tape Machine

Converter A (1)

with newly recorded tape (6's)

fails at 92 triggering on noise

75 Failing to trigger

at 75 failure to trigger always occurred at about 4 seconds after start of tape suggesting fault in recording although no sign of small pulse [[illegible]] at amplifier

[[diagram]]

[[NB11-003]]

10-9-52

Had a bad day yesterday. Fault in Coincidence flipflop wasted a fair amount of time and then the Photoelectric Reader broke down and further work on long programmes was ruled out. Multiplicand and Multiplier tanks were changed and then started further trouble which was eventually traced to W3 flipflop (HC) which was not being reset correctly.

The replacement unit was available and put in this cured the vault on V2 but an occasional fault on V4 still exists.

Occasional failure of the add end pulse has also been noted.

I worked last night on the Tape Machine.

I have come to the conclusion that a great deal of future work is useless until we can come to an understanding with STL.

The reading circuit has been fairly fully investigated and the range of sensitivity is such as would just about cover the variation in signal strength one would expect to get from tape.

Unfortunately the noise level from the tape is likely

[[NB11-004]]

to be fairly high and joins and wear on the tape reduces the workable margin. The present method of running in tape is particularly liable to produce bad spots.

The fact that no provisions for segregation of signal wires from relay wires, and the high surges of current carried on the latter, is a much more urgent problem. It means that with the present set up no reliable collation conversion and reconversion can be expected until quite considerable wiring changes are made to the tape machines to segregate signal leads from relay wiring.

At present we have admitted no responsibility for tape machines other than to keep them going, but the changes considered necessary to bring reliable service would, if carried out by us, relieve STL of responsibility of the electronic circuits

[[NB11-005]]

11-9-52

Discussed my method of binary decimal multiplication with JMMP this afternoon. He has made a suggestion which would simplify this process.

When the multiplicand is shifted, correction of the accumulator is required each time that a digit is shifted past the dividing point between one DD and the next.

He suggests that as the word is shifted it is modified by 6's to conform to the binary decimal form. Unfortunately, the original form is required after 4 shifts so that the scheme falls down.

[[jottings]]

[[NB11-006]]

Questions that arise are

- (a) Negative Numbers & Sign
- (b) Sterling
- (c) Orders and Counter

[[jottings]]

Action	Tube	Compartment
99	99	9

10 compartments
99 Tubes

Orders

[[NB11-007]]

Failed on 12-9-52

Carpenters re PE Reader

Investigation of Counter [[looks more like Counter than Control]] Tank
Investigation of Coincidence Flip Flop
Negative Multiplication
AC Flip Flops

Work for Monday

Draw up sketch for modifying reader desk to sink PE Reader (See Clements re flange to permit easy fixing).

Miss Hills to do time analysis

Tape Machine

- (a) Noise
- (b) Trigger of read flip flop

[[NB11-008]]

Tape Machine 1

Tape Make up NE (3) [[NE Number End ?]]

Amplifier setting 89
Amplitude + 40/46 - 40/42
Noise +10 -8

[[diagram]]

Biggest amplitude of noise occurs during recording and may be effect in amplifier.

Operate tail key +14 -22

on No 1 tape machine
Rec Mag Off no effect on read but
record flip flop operated
Read Key -9 volts
Reverse Key -12 volts
Box on - to limit of amplifier in both + and -
change relay limit of amplifier

Tape Machine 2

Box on - limit of amplifier
Read - no effect
Reverse - no effect
Tail - 8 volts
Change - limit of amplifier

Tape Machine 3 (Collater)

Box on	10 volts
Change	10 volts
Read	No effect
Reverse	No effect
Tail	No effect

[[NB11-009]]

15-9-52

Further tests on tape machines have shown that the most severe interference occurs between adjacent tape machines: the 2 collaters being the pair tested.

These did not show such severe effects as have been seen on previous occasions but there is sufficient evidence to show that any of the spikes noticed on the output of the read amplifiers are likely to trigger the flip flop.

Tests which have yet to be made are on the relative amplitudes of signals from different tapes. There is reason to believe that signals may be quite different. Two examples are the two test tapes in "Make up number end" and "HS 24"

for the former to work satisfactorily a higher gain setting of the amplifier is required than for the latter. If a setting is made for the first, then noise or interference on the second causes corruption.

TRT has discussed my notes with RMS on this subject and I believe that a meeting

[[NB11-010]]

with STL is to be called.

I think that I may be called upon to demonstrate the points I have made and in this case it would be as well to have specimen tapes giving

- (a) different amplitude of outputs
- (b) interference or noise

as well as to show the amplitude of signal at the output of the amplifier resulting from interference.

The relative signal level will be easily measurable using the CRO provided that the difference is noticeable. Probably a better scheme would be to view the output from the flip flop where the effects of an abortive trigger is fairly clear.

Using the weakest tape the amplifier can be set up to give reliable triggering. Then by operating relays known to cause offence the gain of the amplifier can be advanced until the interference causes the flip flop to operate then the relative seriousness of the solution will be given in terms of the amplifier setting.

This will also avoid any danger of pick up interference on leads connected with the input of the flip flop

[[NB11-011]]

I have been trying to get a test program that will test negative multiplication but so far have not succeeded. Grover had produced one that appeared to have a fault in it and today we proved that this was so. The trouble was that he had assumed that negative multiplication would produce the complement of the same V order in the upper half of the accumulator. This is not necessarily true as if a negative number extends down into the lower half of the accumulator, then that in the upper half is only the reflected number. However, even allowing for this there appears to be some errors in N orders but how to trace them without a program is a problem

[[NB11-012]]

Tape Machine 1

Make up NE

Failing to trigger at 82 degrees 20/+28 20/-28

Fails to trigger at all at 70 degrees +18 -18

Triggering on noise at 95

Triggers on C relay at 80 degrees

16-9-52

A fault on the accumulator clearing waveform and circuits wasted 5 hours today. After giving Shaw a lead I left him with Grover to sort it out but at dinnertime not much progress has been made. By 1:30 we had pinned it down to a fault in the accumulator and soon after located it to ACC I where the signal was OK at the A2 but shaky after the clear gate.

The clearing waveform was bumping the 35 volt line a bit, but it was by changing the storage unit that the fault was cleared.

[[NB11-013]]

I have been chasing trouble on tape machines today. I have established that there can be a difference of several volts at the amplifier output due to the recording. I have yet to establish whether the lower signal is due to the gradual deterioration of magnetisation due to moving past the read head or whether it is surface wear or whether it is a different quality of oxide.

In order to check the effects of wear, I propose to put a new symmetrical signal on [[raw? new?]] tape, record the amplitude of output and then let it run for several hours measuring the amplitude at intervals. I will then re-record on the same tape and repeat the process.

It will be useful to make a critical examination of the physical state of the tape before and after the test particularly at the join. A point that has intrigued me for some time now is that the wave form of the signal from the read amplifier always showed considerably more noise on the parts where signals

[[diagram]]

had been recorded than where the tape had been tailed. I spent some time investigating this this evening.

[[NB11-014]]

And although the source of this noise is not yet traced some things at least have been established.

(a) signals out from the record head as measured by the "test first up" do not have this noise superimposed.

(b) The noise is measurable at the secondary of the input transformer i.e. it is not produced in the amplifier

(c) A signal induced into the read head by the test fixture does not produce it, suggesting that it is not shock excitation of the read head or the transformer. (Unless the input from the test lead is not fast enough to cause it).

(d) Damping the transformer primary or secondary does not appreciably change the signal to noise ratio. An interesting form of shock excitation was noticed on the record head when operating from the teleprinter. This was apparently picked up by stray capacity as it did not appear to be produced by current flowing through the head. Also, one could remove the valve without changing its amplitude.

It would be interesting to cause the record flip flop to record from a square wave and then see what noise was induced on the tape.

This could be done by using the read head and connecting the output of the read amplifier to the record flip flop.

[[NB11-015]]

In this way the square wave generator could operate via the test fixture and thus cause a recording to be made. It would be necessary to operate the record solenoid but if necessary this could be done manually. A most peculiar phenomenon was noticed during testing triggering of read flip flop. Someone had just operated the box key of the collator and immediately the waveform of the read flip flop acquired a kink which disappeared when the collator was switched on again. The kink appeared to be due to reaction of the triggering waveform as it corresponded with the fall of the trigger pulse.

[[diagram]]

No such pulse could be seen on any of the supply lines. However, it may have been an effect of the stabilising circuits when operating under load current conditions.

- (a) check interference on collator machines.
- (b) Investigate kink on trigger flip flop when collator and reconverter are off.
- (c) Compare amplitude of recordings
- (d) make a recording on short note of new tape
- (e) Readings of recordings during life test of loop.
- (f) Re-record on loop and measure amplitude.
- (g) Repeat recording with screen of record head earthed.
- (h) Get Clements to make up clip for operating teleprinter.
- (i) Make up two remote clip for test prods.
- (j) Record using square wave generator.
- (k) Check recording for noise.

conscientious

[[NB11-016]]

[[diagrams / drawings]]

Machine Work

- (a) Coincidence Flip Flop
- (b) Negative Multiplication
- (c) P4
- (d) Converter test programme
- (e) Set-up conditions for converter and reconverter.

[[diagrams / drawings]]

With 6 volts 20 volts
Without

17-9-52

JMMP has advanced the theory that the noise during the recorded part of the tape maybe due to the

supplementary gaps which exist between the pole pieces of the head proper and the sides of the mu-metal screening case. This gap, if regarded as likely to pick up signals from the tape, would be expected

[[NB11-017]]

to produce weaker signals but of random amplitude according to the beat with the signals read by the proper gap. They might also be expected to cause the amplitude of the ~~random gap~~ correct signal to vary as it beats with the secondary signals.

This may also apply to recordings as well as readings although it is not expected to be so noticeable.

In order to check this theory two things may be done

(a) a small mod to the read head interposing non magnetic material between the tape and the sides of the screen so that the tape is only in contact with the proper gap.

(b) Similar mode made to a record head and the resulting recording read in the usual way.

In each case the signal noise ratio should be measured for noise during recording periods and during testing.

Another way of checking this is to make a recording while the flip flop is triggered slowly from side to side.

In this way the full picture of the extra noise will be seen and according to whether it starts up before or after

[[NB11-018]]

the actual signals will give a basis for further consideration.

The trouble on negative multiplication was found this morning. It was occurring in the complementer where the flip flop calling for the reversing of digits after the first digit was occasionally failing to reset.

I immediately assumed the trouble to be similar to the AD1 flip flop trouble i.e. setting and resetting of a flip flop at the same time consequent upon the removal of the additional sign digit. To prove this, I changed the reset from odd D35 to even D0 and behold the program H&N was performed correctly. Now I come to consider what I have done I cannot justify the change.

It is true enough but if they complementer is called upon to deal with a single D35, with my change, it was being asked to set and reset on the same pulse.

For negative multiplication however the pattern being sent was a long one with many digits and consequently

[[NB11-019]]

the flip flop was being set early in the minorcycle.

On considering the circuit however it seems just possible that the odd D35 in resetting the flip flop allowed enough of the last digit of the number (also a D35 and slightly delayed by an amplifier) to get through and retrigger the set terminal of the flip flop.

This would be overcome by the use of an even D0 as I found but this produces an extra sign digit which must be taken care of in suppression circuits of the accumulator.

[[NB11-020]]

18-9-52

A demonstration today to a committee of DSIR was very nearly a complete flop.

It was arranged that they should see the slow speed payroll job first followed by an attempt at high speed output.

There were several mistakes in the first causing some amusement and the annex job was almost unmanageable.

After some consideration it was agreed that the probable cause of the slow speed job failing was that TRT had inadvertently interrupted the light beam on the PU reader.

I had been a little afraid of this when the data was going in but hadn't the courage to interrupt his discourse.

Had I been quick witted enough I might have suggested putting the data through again but it was only at the inquest afterwards that I had thought of this. The trouble on the HS outlet seems to be the shape of

pulses going to the annex from the transfer unit where the delay introduced by the amplifiers is too much to hope for reliable

[[NB11-021]]

working. Tomorrow Shaw and I are going to concentrate on this and I hope we shall soon clear the fault. I have done a little more on tape machines.

Concentrating on the question of noise amplitude during the time when signals are being received as compared with blank tape

I have tried

- (a) recording a symmetrical character repeatedly
- (b) recording line feed repeatedly
- (c) recording alternate lengths of mark and space over the tape
- (d) recording line feed signals with gaps of tailed tape between.

The results of these experiments tend to show that the unexplained increase in noise level is due to a quite slow ring in either the read head or the transformer or both acting together so that a signal element

[[diagram]]

[[NB11-022]]

is followed by an echo (does it proceed it as well)?

This fits in well with JMMP's idea of the supplementary gap due to the mu-metal case, but I have tried [[begin strikeout]] putting a pei [[end strikeout]] holding the tape away from the case by a piece of [[illegible]] without changing the effect.

However there seems to be good grounds for supposing that this echo if considered for the different elements will cause beats which may double the amplitude and produce a complete explanation of the phenomenon.

Possibilities are

- (a) The echo is actually recorded on the tape
- (b) The echo is produced by the read circuits
- (c) Both the read and record circuits may contribute towards the effect.

There are many experiments that can be made to prove or disprove any of these possibilities.

[[NB11-023]]

Record head off

[[diagram]]

[[COMMENT (JD): several diagrams of waveforms over the two pages but note about Dimaphon at top of 2nd page]]

Dimaphon Flex £4/3/6

[[COMMENT (JD): a google search found Dimaphon: a brand name for a dictation recording machine made by Assmann Dictating Systems Ltd. Dimaphons recorded on reusable plastic discs or records and were equipped with foot pedals and earphones. from 1948 (also a ref in NB14)]]

[[NB11-024]]

[[diagram]]

MARK II

Input
Conversion

Composition
Reconversion
Output
[[diagram]]

1. Programming
2. Internal Converter & rec
3. External linked
4. Detached

Bulls tabulator
Brit Tabulation

Output
Rele[[illegible]]

Conversion & Reconversion

[[jottings]]

[[NB11-025]]

[[diagram]]

Box 15 gain 80
Signal Am +40 -40
NoiseAmp +8 -6

[[jottings]]

A little more progress on tape noise today.

By taking off the three meg clamping resistance it could be seen that there is considerable ringing at about 1 KC on the tape machine I was checking. In addition to this there was also a low frequency component which is likely to be more troublesome.

My problem is to find a way
(a) to eliminate the one KC so that I can examine the source of the 50 c/s
(b) Get rid of the 50 c/s.

[[NB11-026]]

[[diagram]]
[[diagram]]

Tape Machines

Present all together
Segregation Sensitive
Insensitive

Recording
(a) Interference
(b)

Rewiring of some record circuits according to Reynolds

[[NB11-027]]

26-9-52

More rigid control of light & Black load

Daily list of proposed work prepared previous evening

More time for Convert Reconvert testing

Tape Machines
Interference

Reconverter High Pressure

Remote Control Button

Parker Training

[[diagram]]

Clements re hole in desk

[[Sticking ?]] Stage I

[[NB11-028]]

Proceed with such tests as are necessary on Tape Machines.
Direct Parker's Work on Reconverter and supply him with a general picture of the scheme.

Queries on Converter Test Set

STSc on Unit A

[[NB11-029]]

Conversion Reconversion Multiplication Division

Conversion

Number to be converted in Multiplicand Tank.

Inspection of digits ~~starting at~~ by stationary D32 pulse & ~~going down~~ by shifting multiplicand & inspecting with D32 using output to set flipflop reset at Do flipflop waveform used to gate constants into adding circuit.

Result in Accumulator ~~sequence may be~~ shortened by starting with any digit lower than D32.

Reconversion

Number in Accumulator intermediate results in Multiplicand. Constants added or subtracted from Accumulator. Final results stacked in punch card form in storage tank. Result register require to be shifted one place left every second minorcycle.

Both conversion and reconversion can be used for decimal and sterling and limiting can be achieved in each case by starting the ring counter at a later stage.

Multiplication

as at present but special gating arrangements are necessary for using the multiplicand tank for special purposes in conversion reconversion

Division

[[begin strikeout]] Number to be [[end strikeout]] Minuend starts in Accumulator. Divisor held in Multiplier tank which is required to be shifted. Multiplicand tank holds result.

[[NB11-030]]

Stimulation of sequence as for multiplication and shifting.

This will start up escalator waveforms.

Reconversion on new scheme ("punched card" form) calls for an interruption of the shifting in the TCT. The present arrangement does not permit of an interruption without destroying the circulation completely. If during the intermediate coincidence seeking in the reconversion sequence a Do reset was applied to the W2 flip flop, this would ensure that the escalator pulse remained in the same digit position until it was required to resume the reconversion sequence.

Conversion and Division requires the shifting of both the Multiplicand and Multiplier tanks. This calls for a Multiplier shifting unit on the same basis as the multiplicand: -

[[diagram]] [[COMMENT (JD): the diagram has two diagonal pencil lines i.e. crossed out]]

A shortened Reconversion is desirable if used with punched cards. A method of limiting the time for both Conversion and Reconversion would be desirable. In the case of conversion it would be possible to discriminate between long and short numbers using the long / short discriminant but owing to the proposed method of manufacturing the pulse patterns a short number would have to be treated as a long number in the multiplier register otherwise its significance would be multiplied by two to the power 17

[[NB11-031]]

It would be possible to make the action Conversion give special significance to the L/S discriminant but it would be simpler to say that all reconversion will be of long numbers.

Alternatively at the expense of making a conversion from decimal to binary a matter of two orders I.e. Hold and Convert the sequence could be started at any point so that the [[begin strikeout]] actual [[end strikeout]] time taken over conversion could be limited by using the address digits.

As there would be no gain in time in such an arrangement it would be better to stipulate that numbers to be converted are held as long, result in a long binary number in the accumulator and must be shifted appropriately if required to be stacked as short numbers.

It seems that the remaining needs for a short Reconversion is the simple and definite one of positioning of results on the punched cards.

To do this the "time" part of the address could be used. A simple gating of the order with five digits D2 to D6 would cause the ring counter to be reset to one of five predetermined positions and then the Reconversion process would proceed until the ring counter reached "home".

This simple procedure would mean that only 6 different numbers of digits would occur in a reconverted

[[NB11-032]]

number and if any other kind were wanted, [[begin strikeout]] blank spaces [[end strikeout]] zeros would be punched on the card

[[diagram]]

It would be possible (but undesirable) to have a different 6 kinds of number according to whether decimal or binary reconversion was being performed.

It was originally thought that as in Conversion and Reconversion the most significant pattern was available first, it would be necessary to change multiplication so that the most significant partial product is added in first instead of the least sign.

That is not necessarily so.

In Division it is required that both the register holding the divisor and that holding the result should be shifted throughout the process. Bearing in mind that reconversion is similar in many ways to division and that it would be desirable to plan any change to the machine so that division could be added easily, then a ~~simple~~ convenient arrangement would be to shift the multiplier as well as the multiplicand and to gate out the digits in turn by inspecting with a ~~D35~~ D32.

In order that the re conversion sequence can be arrested while the coincidence unit is being called in

~~[[NB11-033]]~~

to stack the intermediate results it is necessary to be able to halt the shifting in the Timing Control Tank without altering the position of the escalator digit.

~~This can be achieved by arranging for a Do to reset the flip flop in the TCT SU for the whole period when coincidence is being sought. A possible way of doing this is to add the following gate to this unit:-~~

~~[[Diagram]]~~

~~This would mean that the normal shifting would take place when A B and C were set up in the first ring counter but after the fourth digit had been dealt with D would open the gate permitting a Do to reset the flip flop. Thus the DH would always set it but before~~

~~This could be achieved by arranging that the set of the flip flop in TCT SU was conditional upon no stimulation having been given to the coincidence unit.~~

~~[[NB11-034]]~~

Multiplicand for Conversion

LS discrim starts ring counter for L or S

F2 must not operate

Patterns to Accumulator via Transfer unit

Negative numbers.

(a) Conversion. A sign digit sets path for result of conversion to be taken via complementer XX

(b) Reconversion. Sign digit causes number entering accumulator to go via complementer.

XX alternatively the ~~partial result~~ pattern added ~~of conversion~~ must go via complementer

~~[[diagram]]~~

Transfer

[[diagram]]

[[NB11-035]]

Negative Reconversion

It is required that

a digit is put in the 11 position of the result tube at the commencement of reconversion if the number being reconverted is negative

D E C B I N Bined

B I N D E C Decked

Started

Course on troubleshooting

Fantl re M5 short store test.

Kaye re Time Table

JP re Minutes of meeting on tape machine

Fault on Right Shift

[[NB11-036]]

TRT has hinted that RTS [[COMMENT (JD): Ray Shaw]] needs a changed outlook on fault finding.

For best part of yesterday he was searching for the cause of extra digits left in the Annex after reconversion limiting and eventually all the big guns were turned out to solve the problem.

By making up a new diagram for the different stages in outlet operation the trouble was soon boiled down to three possible causes and then to one.

Examining this case more closely it was seen that some breakthrough which had been hitherto ignored as not happening at the right time to cause any trouble was in fact able to go into the annex tank where it was delayed one major cycle so that when it emerged it was in the same position as the offending digits.

2-10-52

The force of the above comment has been brought out again today when after changing some valves in the PA decoder the machine failed to work. I was going to lunch and after putting Shaw on the track of the trouble by showing that

[[NB11-037]]

"1" were being added in the accumulator when a copy order was being carried out. On arriving in the mess I realised that the fault must be that a round off digit was being added in either at the same time or instead of copying. I phoned him and told him where to look for the trouble, but on returning some 40 minutes later

found him still at sea having progressed not an inch.

After discussing the problem with JMMP I have now decided that I must have a serious talk with him. He must get down to a serious study of the machine and how it works. Even at the expense of the courses he proposes to attend on Computing Machines he must make his first priority understanding our machine.

When Mann comes to join us at the end of the month he must be in a position to teach him the details of the circuits starting at [[begin strikeout]] block [[end strikeout]] an appreciation of the functional design of the machine from Block Schematic diagrams

[[NB11-038]]

Progress on the design of mark 1 1/2 proceeds. I have met one or two snags in the circuitry controlling the input to the Accumulator but none of them seem to be insuperable. TRT has told me that he is investigating the possibility of patenting my conversion and re conversion. I think this stands a better chance of survival than my division scheme had.

[[jottings]]

P1 / 2 / 3

Annuity

De Havilland. 3 hours

Reader maintenance (relays)

Miss Hills Development

[[NB11-039]]

6-10-52

The test runs on the Reconverter have gone very badly so far. Machine time to the extent of 25 hours has been lost on faults much of which has been due to Annexe.

Today we had runs of some hour or so with only minor hitches and although the first produced only two noticeable errors the second run was mainly rubbish.

Smith attributes a lot of this to tape machines and he may well be right.

Other troubles have beset the machine today.

These are mainly due to interference borne on the control wires which have recently been attached to the control desk for setting up initial condition on the inlet and outlet circuits.

An initial test has been made with the Converter but the results were not known when I left this evening.

[[NB11-040]]

Photographing store for test programmes

Procedure for Annex trial runs

(a) Programme in

- (b) Discharge first few bakeries
- (c) Print out
- (d) If any trouble investigate
- (e) If reasonable results then proceed with discharge and after fitting available tape boxes --
Carry on with any other machine work awaiting

Miss Hills keeps

- (a) A list of jobs awaiting divided into 2 parts
 - 1. Require attention of S or L
 - 2. Other jobs

(b) List of jobs for the day

(c)

[[NB11-041]]

Programme to extract contents of store digit by digit

1 0 1 0 1 1 1 0 1 0 1 0

H
C

Draw up fresh list of reasons why Camera is desirable

Testing reconverter and converter bring converter into maintenance programme

Programme for exchange of short tanks

Consider how Z lamp can be lit without Z order

Camera

Records of programmes

Records of data (outlet and inlet)

[[Illegible]] Post mortem

Work out how many times post mortems have been used. and estimate machine time

Examples:-

Programmers sheets

Engineers sheets

Conversion tables

[[NB11-042]]

If the photography of store were to be done at a high speed then here is a ready made [[illegible]]

Camera interlocked with machine
photograph one tube at a time

This would give at least 30 lines of type per second being recorded on film.

The film is then run through a reading mechanism which uses a photo electric cell for every character in a row. [[illegible]] the film is raised a 1 digit would operate the hammers in much the same way as the hole in a card

8-10-52

Spare Changeover Unit

Mod to Changeover Unit

Clowson tells me that the Converter is to be used for life testing trigger tubes. All tubes on converter are to be new types and detailed records of running time, tube position, reason for failure etc.

This is apparently a direct result of TRT's complaint to Ridler on the subject of trigger tubes, but I don't know whether anyone else has heard of this plan for testing in the converter.

[[NB11-043]]

Today I tried to get Reynolds to give me some clue as to how his plans are going on the interference front. He was very "cagey" and said a statement would be made at the meeting on Monday (apparently there is to be a showdown on Monday at Cadby with all the big guns blazing). He did however say that he proposed to refute the theory that interference was of a level that could cause serious interference. His view is that the interference I showed them was [[begin strikeout]] all [[end strikeout]] mainly picked up by oscilloscope leads. It is possible that scope leads may have enhanced the picture but he can hardly refute the fact that interference could cause triggering of flip flops when Leeds were not connected.

Required Programme for exchange of short tanks.

[[NB11-044]]

0.6 per second

37 1/2 milliseconds per index point

Print at 100 cards per minute

31.8 if at 120 per minute

Minus Sign

Suppression of zeros

Punch

Miss Hills Telephones

Clements re Room Change

Progress meeting

Attachment for raster scope P1.

Communication with Computer Room

Bays

Photoelectric Reader
allow one day for modifications

JMMP re "new circuits"

Mod re clearing W12

Mod to LC45

Mod to starter

? Reader Desk Wiring Diagram G.R.G.

Mr TRT re Reconverter trial
Converter and tape machine

Converter

[[NB11-045]]

It is required to carry out an order and during the stage 11 of that order to stimulate coincidence unit several times without terminating stage 2.

[[COMMENT (JD): on page 49 he seems to have actually tried this idea in practice. There is reference to stage II – two I's with bar over top and bottom i.e. a Roman 2. Even in this sentence I'm not sure whether he is referring to the "same" stage 2 / II]]

Probably best order to use is round off and use AD4 to stimulate coincidence. If end pulses from computer are disconnected and C12 -- used to inhibit R1+R2 then the coincidence unit will be stimulated every second minorcycle. This shows that it is desirable to [[illegible]] of CV while coincidence is being found. In any case the [[illegible]] waveform [[ends abruptly]].

Design and Circuitry of Electronic Computers

Newman,

1
2 Newman
3 Wright
4 Wright

5 ACE
6 ACE
7 Manchester
8 Manchester
9
10

[[NB11-046]]

If I use one of the shift orders and divert the shift end pulse as a stimulation pulse to the coincidence unit then I will, by choosing the address part of the order carefully, be able to produce several coincidence waveforms before the multiplication end pulse is produced.

If (i) Shift end pulse mixed in stimulates a CU [[CV ?]]
(ii) Inhibit R2 by negative shift coder
(iii)

Standards to check tape mechanically
Present tape appears OK
Mechanical adjustment - Clements

50 cycles per second to operate TP relay
Vary sensitivity of flip flop (vary HT?). Observe Flip Flop and output to test head.

Measure anode current of record flip flop valves [both sides] with Set and Reset condition

STL to specify coil
Two coils to be made up and a second head built here.
Compare and send one to STL

[[NB11-047]]

Read [[begin strikeout]] Head [[end strikeout]]

As set up.
Amplifier to have monitoring resistance in anode at HT end.
Mr Reynolds to check point
Comparison of trigger pulses with flip flop output with gain control variation
? Sensitivity of flip flop could be adjusted by varying HT plus or minus
Reynolds to investigate means of varying HT by means of NEP plugs.

Minutes of agreement with Mr Reynolds on Testing and setting up of tape machines.
Clements re attachment to Raster
Allow one day on photo electric reader for Change of Plug, Fitting switches and marginal check
Ask for work on Ring Counters
Reset of W12 requires mod to LC45 and starter unit
Circuit Diagram of Diode Tester
Mr TRT re converter trial and Reconverter plans henceforth
Mr TRT re Miss Hills

[[NB11-048]]

[[begin strikeout]] E P 1 27-9 [[end strikeout]]

Next Thursday I take command of my own office. Pinkerton and Kaye are moving into Caminer's old office with Barnes. Caminer is taking over Mr Stevens office. He in turn is moving next door again.

Clements was very desirous of putting his new man in with me but after a great deal of discussion I have persuaded him against this.

We have decided to block the right of way between the office and the computer room via the workshop so as to provide more room in the workshop. The bench with bench shears and vice is being moved out into the computer room and the drill mounted at the end of a new bench which will accommodate the new mechanic.

Mann is starting on the 28th of October at the top of E grade (190/-)
The lad we interviewed is probably starting Monday week.
Thompson - the new mechanic starts on Monday

[[NB11-049]]

Required for new office.

- Desk diary
- Callender

Today I made the first experiments on the stimulation of coincidence during stage II [[Roman 2]] of an order.

Using a left shift order I used the negative coder waveform to inhibit R1 + R2. The end pulse of the right shift order was used to stimulate coincidence and not as an end pulse. The W16 waveform was removed from the TCTSU so that the escalator pulses continued so as to produce a multiplication end pulse. The W16 waveform was reset by the multiplication end pulse so that shift end pulses were produced in abundance to stimulate Coincidence.

The effect was as expected and by changing the "address" of the shift order, the number of coincidence waveforms could be changed. It was determined that the coincidence waveforms were in fact routed to the output gates of the tubes nominated in the

[[NB11-050]]

address. The results of this experiment were limited but they show that as hoped, there is no logical obstacle to finding coincidence several times in the action of the same order.

Reconverter Trials

Print off twice when errors are apparent

One hour morning and afternoon

Details on log to tie up with result sheets. Tape machine numbers to be used.

[[NB11-051]]

Specify for testing and setting up

[[illegible]]

Life test on short loop

Check on Join

Additional mods to [[illegible]]

Double [[illegible]] for TM 3 weeks

Order:-

- Collater

- Converter

- Reconverter

[[illegible - Housing?]] of Multicathodes

Log condition of resetting of Multicathode tubes

Converter

Collater positions on collator II

Switching on Test Sender

"Cancel" not "erase"

How did Clements get rid of the trouble on spacing in the new sprocket carriage

Micro switch changes to be done in situ

[[scribbles]]

Caminer's Dialogue

2 o'clock Wednesday 15.10.52

[[NB11-052]]

C and R for Barnes

[[begin strikeout]] Tape Machine Draft [[end strikeout]]

Mod sheets 38 and 39 sure Shaw

Tape test Gibbs

Valve records

Diode Characteristic Meter

Photo Electric Reader

A is triggered to be by Odd D35 if A does not respond immediately it may not prevent the next pulse ED0 from resetting F2 via G3

Resetting of f1

Assume f1 is set ie tape ready to be read then at even D30 a 20 microsecond pulse is presented at G 15. If

f2 is not set ie cell no 5 not up ie control combination then this resets f1 by back edge of pulse.

If f2 is set ie number digits to be read then G 15 is closed and f1 is only reset after ring counter has circulated ie when A is up again.

[[NB11-053]]

Mr TRT

Miss Hills - diagrams

Accommodation in computer room

(a) personal effects

(b) Desks and Tables

(c)

Cupboard

Mr Caminer

[[begin strikeout]] Test Programme for Converter for use with Test Sender [[end strikeout]]

P2 for Reconverter

[[NB11-054]]

Mr Harild

Check on position with tape machines and Collater

Arrange for trigger tubes to be pointed

Circuitry

Pulse Techniques
Electronic Switching
Gates
Staticising (Triggers and Flipflops)

Diagram

ACE

1/3 microsecond pulses one microsecond between
risetime of .05 microsecond

[[NB11-055]]

[[diagram]]

Limiting amplitude of output would restrict effect of time constant to a very small part of the full time of rise

DC coupling

[[diagram]]

R2 and 3 being compared with R1
stray capacity of 750 K is appreciable ie poor rise time
C1C2 arranged for compensation but the effect of strays on R1 is increased

[[diagram]]

C2 arranged so that swamps
 $C_g \quad C_1R_1 = C_2R_2$

R1 : R3 equals R2 : R4

[[NB11-056]]

[[diagram]]

potential across R2 equals R3

Errors in line constants cause

[[diagram]]

or

[[diagram]]

effectively half

Gates

[[diagram]]

Long tailed pair

[[diagram]]

As grid of V2 is raised no current until at 190 odd current changes into V2

[[NB11-057]]

[[diagram]]

[[diagram]]

negative pulses

limitation of pulse determined by one of the inputs

[[diagram]]

[[NB11-058]]

[[diagram]]

gating using grid and suppressor

1. Required [[valves? / values?]] that [[bottom?]] well
big pulse required on suppressor
Loss of time due to suppressor char [[characteristics?]]

[[diagram]]

Gain R2 divided by R1

[[diagram]]

Gain only while grid is between diode catching points

[[NB11-059]]

"Triggers" [[points into centre of following diagram]]

[[diagram]]

Change over time .07 microsecond

[[diagram]]

DC change of output [[points at same diagram as "Triggers"]]

[[diagram]]

Trigger (a) by diode

suppressor

[[NB11-060]]

16-10-52

How to get numbers into the Annex tanks and at the same time keep count of no of minorcycles filled

[[diagram]]

[[diagram]]

[[diagram]]

Information required in store.

Access only ~~while~~ by coincidence waveform ~~not being~~

If coincidence unit can be used while arithmetic circuits are operating
Why have feeder?
4 digits at a time

[[NB11-061]]

17-10-52

General

Reader Desk

Plan changes with personnel concerned eg cables etc.
Position of cable form Gibbs

W12 reset: Gibbs to draw up sheet showing details of changes.

Tape Magnetic Life Tests

[[diagram]]

[[NB11-062]]

21-10-52

Fault caused by a mod to the C&D D unit. The mod shifted the loading of the annex clock pulse supply from clock 2 to clock 1. The manifestation of the fault is peculiar in that almost everything appeared to go wrong. Two of the most obvious things were:-

(a) A 28 order in position 20 of the initial orders was corrupted to a 20 order although it was not being transferred to and from the accumulator.

(b) Coincidence was being found with numbers not in the Sequence Control Tank.

Both of these faults could be classed under "dropped digits"

Mr P

Fault sheet cards
Telephone to control desk

[[NB11-063]]

The obscure fault mentioned above is due to a storage unit in use in position 0 which was dropping particular digits out of circulation.

Telephone - Mr. Edwards
50 Volt supply

Aylott 8:00 o'clock Monday

Mann 9:00 o'clock Monday

Desk Mann Parker

Drawing Desk

Arrange to have modified for circuit diagrams

PE Reader Switch

Reader desk Wednesday

Camera discuss separately

Reader desk organised cables

Machine test insulate installation of LC10

50 cycles per second on store diode for marginal testing.

[[NB11-064]]

Page 64

[[diagram]]

Mr. Wright NPL

Decoder

Two types

From pattern to one of two-to-the-power-n lines [[2 to the nth - can't show superscript]]

[[diagram]]

[[jottings]]

[[NB11-065]]

Effect of capacity

10 microseconds to settle down

[[diagram]]

96 components to produce 32 outputs

LR Differentiating networks

[[diagram]]

DC restoration

[[diagram]]

[[NB11-066]]

Pulse Generators

Ace .3 width 1 megacycle

[[diagram]]

Amplifiers

[[diagram]]

$$\text{input impedance} = \frac{1}{1 + A} + \frac{1}{G}$$

Cathode followers

[[diagram]]

output [[square pulse with trailing back edge]]

TRE

[[diagram]] One valve for rise one for fall

ACE

[[diagram]]

[[NB11-067]]

[[diagram]]

fast rise due to negative feedback from cathode

[[Equations]]

output impedance of order of 5 ohms

Pulse wideners

.3 microsecond to 1 microsecond

[[diagram]]

[[NB11-068]]

23-10-52

A [[illegible]] ant of this evenings lecture [[illegible]] application of amplifiers to the transfer unit problem.

1. A low impedance input into which all of the store outputs could be mixed.

[[diagram]]

V2 is conducting. V1 is cut off
input causes V1 to conduct & cuts off V2

2. A low impedance output to drive all gates connected to feed line

[[diagram]]

V1 & V2 act as normal cathode coupled amplifier but cathode of V3 connected back to grid of V2 to provide

improved time of rise and an output impedance of about 5 ohms.

[[NB11-069]]

Matrix decoder

[[diagram]]

[[diagram]]

	high	low
0	a b e g	c d f h
1	a b f h	c d e g
2	c d e g	a b f h
3	c d f h	a b e g

[[diagram]]

[[diagram]]

loss of 10% of voltage

[[NB11-070]]

Progress Gibbs

Dutton & Clements to plan change of Reader Desk
Parker on Tape Life Test

Investigate Panel 1 in Tank 0

Converter

Interference Me

PE reader for Modo

[[begin strikeout]] Erase [[end strikeout]] Cancel

Instal LC10

24-10-52

- G Tape Life Test Gibbs
- CD Reader Desk Mod Clements & Dutton
- D Panel 1 (ex tank 0)
- Interference on lines to control desk
- Tape Machine Programme
- Field Telephones Mr Edwards
- D Marginal checks on Panel 1 (Test Rack)
- C Clements re Camera fixture
- Mann
- G W121 Reset Gibbs to draw up list of changes
- G Reader Desk Cables - Gibbs
- D Check that entire stock of triggers is marked
- D Harild re Collator
- S P2 faults (store trouble Shaw)
- TRT re Miss Hills - Accommodation Cupboard for TP spares

Parkers log for last week

[[NB11-071]]

It is required to

Transfer from the third quartet of the accumulator to the store.

This calls for a change in the amount of delay in the transfer unit



Normally a long number address causes a delay of 1 minor cycle resulting in A and B being stacked in store.

Short number calls for A to be stacked with either one or half minor cycle delay according to whether it is to be stacked in an odd or even compartment.

To stack B in a short compartment calls for a 1/2 minor cycle waveform with a one or half minor cycle delay according to whether it is to be stacked in an even or odd compartment.

If the order is given inform 28 / n (odd) / 19 then number receives 1 minor cycle delay with a half minor cycle coincidence waveform which results in A only being stacked in an odd position

For B to be stacked in even compartment

- One minor cycle delay
- Half minor cycle waveform
- Stack in odd compartment
- Half minor cycle delay
- Half minor cycle waveform

[[NB11-072]]

But with F1 and F2 four possible combinations are possible

eg delay coincidence

1/2	1/2
1	1/2
1/2	1
1	1

	delay coincidence		from	into
[[illegible]]	1/2	1/2	A	F
F1 only	1	1	A & B	E & F
F2 only	1	1/2	A	E
F1 & F2	Actual 1	1/2	actual	A E
	Required 1/2	1/2	required	B E

i.e. if the combination of F1 + F2 gave half minor cycle delay instead of one minor cycle then one of the requirements would be fulfilled.

[[diagram]]

Adding to accumulator with both F1 and F2 gives facility

adding of short numbers into 3rd quarter.
but only if they are in odd compartment

Required	into
A & B	E & F
A	E
A	F
B	E
B	F

[[NB11-073]]

Summing up:-

If the control of F1 and F2 upon the transfer unit were changed slightly two additional advantages would be acquired

(a) Short numbers in odd compartments of the store could be added into the accumulator as if they were long numbers i.e. into the third quartet of the accumulator.

(b) A small number held as a long number in the accumulator could be transferred into an odd compartment of the store as a short number.

200 cycles per second works at 83 degrees

Tape Machine Testing

Fixture on rack 2
 Read head
 Frequency 200 x 10² milli volts (square)
 Failing at 82 degrees on dial 28 volts -35 volts
 Never triggering 81 degrees
 OK at 82.5
 Failure occurs when spike of pulse is absorbed by grid circuit of flip flop

Diagram

Hum (mainly duct fixture) 8 volts

At 100 cycles per second working at 80 degrees 35 volts

	fail	78	24 volts
50	work	79	34
	fail	76	31

[[NB11-074]]

Season 6-13-0

[[jottings]]

Jobs for Ann Hills

Record cards - are they complete
 Circuit diagrammes
 Preparation for Store contents
 [[illegible]]

Tree for Fault Finding
Prepare for valve records on STL equipment
Cards for Fault Finding
Circuit diagrams of Diode Tester

Maintenance routine
Control sheets for maintenance operations

* List of jobs awaiting machine

Diagram

[[NB11-075]]

(a) Converter working with machine

(b) TRT re

1. Accommodation Cupboard
Personal Effects
2. Communication with Control Desk
- 3.

Maintenance records

Maintenance work on machine

Date	Time	
Oct 28	0800	Valve movement in units :- LC 30 31 36 27 54 19 1/- 1/-

Maintenance on the machine

As from today's date any maintenance work carried out on the machine or any part of the machine [[begin
strikeout]] whether [[end strikeout]] or it's [[illegible]] is to be entered in full detail in a Maintenance record
book. The person carrying out the work will sign the entry. Modifications to units which are not duplicated
will be entered but reference to mod sheet [[can?]] be made [[instead?]] of

Early morning work

1. Movement of valves in holders
2. Valve testing
3. Rack wiring
4. Reader Maintenance
5. Teleprinter Maintenance
6. Unit changing (machine testing)
7. Valve currents
8. Flip Flop indicator (paint)
- 9.

[[NB11-076]]

[[diagram]]

[[jottings]]

[[look to be related to the proposed red, orange, green light system to display machine serviceability and
availability]]

A C E

10 to power 8 Adds) between breakdowns
10 to power 7 to 10 Multiplies)

Working Range of Trigger

[[diagram]]
[[jottings]]

[[NB11-077]]

Other Triggers

TRE

[[diagram]]

Post Office

[[diagram]]

Manchester

[[diagram]]
limited by diodes both ways

100 replacement valves out of 500 in year

Mercury Store

1000 digits

X cut quartz $V = 570 \times 10$ to power 3 cm/?
 $K = 4.5$

piezo $[[L? h?]] = 12 \times 10$ to power 4 ESU [[COMMENT (JD): ESU is electrostatic unit of charge]]

$1/S = 8.6 \times 10$ to power 4 dy/

density $[[P? ro/greek r?]] = 2.65$

[[NB11-078]]

[[jottings]]
[[diagram]]
Used carrier of 15 Megacycles

X subscript L and X + R [[see diagram]] can be neglected if frequency is greater than 2 x bandwidth
required
effective

[[diagram]]

[[illegible]]
[[diagram]]

Mild steel tubes

Perspex mounting

temperature of tanks + or - .8 degrees centigrade

Attenuation 60 dB

[[NB11-079]]

Propose signalling and communication system between Office Control desk and Programmers.

(a) System of lights indicating state of service ability and current usage and also warning of change of state.

(b) Phone communication controlled at office or control desk and with programmers.

These three lamps to have same significance as on control desk.

[[diagram]]

Orange steady indicates under control of engineers.

Orange flickering waiting to be taken over by engineers.

[[diagram]]

[[diagram]]

EX3 [[diagram]]

EX2 [[diagram]]

Green steady Under control of programmers

Green flicker waiting for programmers

A steady may be used with a flicker

e.g. orange steady green flicker means just coming to end of tests and ready for programmers

[[NB11-080]]

Marginal checks

Connect 50 cycles to storage unit in test rack and test for marginal effects.

Marginal testing of flip flops

[[diagram]]

Assume 5 amps

required to lower 10 volts - 2 ohms

30-10-52

Progress meeting

Query spark quench on light contacts on PE reader.

Camera on control desk

Clamp on CRO [Raster]

Marginal testing and tape machine

[[NB11-081]]

31- 10- 52

Another ominous fault has descended upon the calculator. So far we have got no clue as to the cause of the trouble but the manifestation of it has been shown in several ways [that is if it is one fault].

Its first effect was in a new trajectory programme in which faults started to be printed after about an hours fault free running. These faults appeared to be non cumulative so that they appeared to be different from previous OJ1 faults.

In order to get a different method of approach P1 was put on.

After one or two false starts during which nothing definite was established the job was completed. Further attempts were then made to do the trajectory job but the same sort of trouble occurred after running for about an hour.

P2 was then put on and it was soon obvious that that too was going wrong. Manifestations were extra digits being stacked in storage position rather as if an occasional order was transferred to all the compartments of one tank at one time.

[[NB11-082]]

3-11-52

Apparently P2 was finished on Friday night after changing a decoder in rack 1 of store. It is just possible that all the troubles we had had originated in tanks 8 to 15.

On Saturday morning Clements and I worked on the control desk in preparation for the fitting of the camera. The camera we had worked on in the demonstration must have been different in some respects to the one we have now as we found no difficulty in getting a full picture and good focus by moving the line system up against the shutter mechanism.

[[COMMENT (JD): Something looks odd here! The following text (that is on the right hand half of the scanned double page) does not relate to the previous text about the camera. Rather, it is to do with the problem being discussed on page 81. Odd!]]

On returning the oscilloscope input on the usual test and then the OJ 10 Trajectory that had caused so much pain. Halfway through it failed and it now seems that the store content had shifted although I did not realise this possibility at the time.

After lunch I had another go and this time it got through to the bitter end - so far as I can see without a mistake but afterwards it failed to start up again in order to do the second test.

[[NB11-083]]

Mann benchwork
Ann Hills typing classes
Time- work with Reynold
Marginal checks storage unit units
marginal checks flip flops
Fault finding
Cooperation with Smith on Reconversion
Cooperation with Harild on Collater
Accommodation
 what is required
 tools and personal effects
 table at which to write
bench lighting
 telephone control desk and programmers
light signals
Machine time
 changes in times

early morning testing
Circuit Diagrams
photograph down to 1/4 size

Signalling system
Mr. Edwards telephones
Lights electricians
David Caminer re "outstaying welcome"

[[NB11-084]]

Storage unit
Marginal testing
Heater volts in without series resistor
pulses drop out at 90
No AC applied pulses drop out at 35
Via 47 ohm pulses drop out at 77
Via 100 ohm pulses drop out at 58

Heater via 100 ohm
D3 applied to both I and IG via attenuator
6 volts puts in pulse

OJ 10 18
OJ 6 6
Met 1/2

[[jottings]]

[[NB11-085]]

6-11-52

More trouble since Saturday
(a) Digit pulse generator
(b) Extra digit in store
(c) Photo electric reader dropping 2's digit

Marginal check on store shows interesting results but these need investigation.
Marginal switch on photo electric reader has been fitted.
Marginal check on storage units in coordinator and computer.

Caminer re programmers during fault finding
Smith re log of work on re converter

Our spell of trouble on the computer seems to have cleared. The last spot of trouble which had probably been with us for days intermittently was a high resistance contact on the clearing diode in Accumulator I. The valve in question has been downgraded but nothing was found on it on the tester.

[[NB11-086]]

Effects of marginal store tests.
(a) A widening of pulses causing extra digits to go in
(b) Narrowing of pulses causing them to drop out.
(c) Affect on input and output gates causing [[begin strikeout]] numbers [[end strikeout]] digits not visible [[begin strikeout]] in store [[end strikeout]] to be transferred in and out.

Shaw for [[illegible]] Tuesday
W.K. will do more wiring [[COMMENT (JD): who is W.K. ?]]

7-11-52
Progress Meeting

Mann to do layout diagrams for H.K. [[COMMENT (JD): could this be the W.K. mentioned above – these could be wiring layout diagrams]]
Consolidation document for Shaw
Camera trial
STL Control panel
Marginal tests- store- short tanks
Spares for short tanks see TRT
Pulse wiring for Tank No SRs
Frequency control unit tests

Storage units and tanks

[[NB11-087]]

10-11-52

For a while it seems we may be out of the woods. A fault in clearing the accumulator appeared to be the main cause of trouble although there were obviously at least three faults occurring together at one time during the flap.

Marginal testing of storage units seems to be a good thing and one of the first things to be investigated is why some tanks can tolerate the 6.3 AC and some can't.

I think we must proceed thus.

Arrange for a good tank and storage unit to be above a bad one with AC injected into both of them the various positions are to be compared on a double beam scope.

This should give some lead as to which part of the circuit is responsible for the trouble.

If it is suspected that a particular tank is giving third reflections, this can be checked

- (a) by switching the storage units and repeating the exercise and
- (b) by using the wide band amplifier to compare the signals received from the tanks

[[NB11-088]]

Barnes has completed report no. 12 on consolidation and a mighty thing it is.

It deals with re conversion only; the subject of conversion being so much simpler can be tacked on afterwards. On rereading this work again I have found another way of simplifying part of the circuits which is worth having.

Marginal Tests on Store

Using tank 34 with LC1 – 23 and (a)

Using tank 35 with LC1 – 9 (b)

the latter storage unit being one which had been rejected on a previous occasion when reflections were shown to be present.

The first (a) combination was good - no reflections

The second (b) combination was bad - third reflection
with gain at maximum on both tanks

(a) 3rd was 10% of unlocked

(b) 3rd was 50% of unlocked

changing around the tank so that tank 34 operating with LC1 – 23 results as for (a)
Transmitter of LC1 – 9 fed via

[[NB11-089]]

tank 34 to receiver of LC1 – 23
Result - 3rd reflection about 20%

Tx of LC1 – 23 via tank 34 to receiver of LC1 – 9 3rd reflection about 35%

This suggests that the main cause of the reflection is to be found in the receiver of LC1 – 9.
Using the wide band amplifier ~~the two panel~~ the two tanks were compared and found to ~~be almost~~ have no measurable difference.

The receiver valves of the two storage units were interchanged

	V1	V2	
LC1 – 23	47	48) original
LC1 – 9	163	165) position

The conditions are now more than reversed LC1 – 23 produces large 3rd reflection spikes while LC1 – 9 behaves normally.

Testing of valves shows that valves ex LC1 – 23 are below standard and should be rejected [low emission] while those from LC1 – 9 are up to normal standard.

An attempt to introduce sufficient negative feedback by removing the cathode condensers from V1 and V2 proved too drastic. It seems however that by splitting the cathode load of these two valves and decoupling part of it ~~some~~ the required amount

[[NB11-090]]

of feedback could be achieved. It probably would be better to provide the feedback over the two valves

[[diagram]]

I have today tried out the effect of AAC injections on most of the short tanks [after finding that the accumulator was adrift presumably due to settling down of glycerin filled tanks.]

~~All of the computer~~

Results	OK	no good	not tested
accumulator I	y		
Accumulator II	y		
Multiplier	y		
Multiplicand	y		
TCT			y
Transfer I	y		
Transfer II	y		
Order		y	
SCT	y		
Counter			y

[[NB11-091]]

This suggests that by applying this marginal test to the whole of the computer [plus the transfer tanks), a quick check of a far greater value than before would be possible.

Points that need to be connected up to the AC supply are:-

Computer I	Multiplicand)	
	Multiplier)	1
	TCT)	

Computer III	Accumulator I)	2
	Accumulator II)	

Coordinator 1	Transfer I)	3
	Transfer II)	

Coordinator 3	Order)	
	SCT)	4
	Counter)	

[[diagram]]

[[jottings]]

[[diagram]]

8 racks of store
2 racks of computer
2 racks of coordinator
2 racks of Annex

--
14

[jottings]

[[NB11-092]]

A 1K pot capable of carrying 2 amp
.04 x 1000 Watts = 40 watt pot

Alternatively a transformer with suitable steps on primary.

Supposing present injected voltage is 3 volts RMS then it is required to inject from nought to 6 volts in 10 steps

But it is desirable to be able to raise these injected volts from zero ~~without~~ in a gradual way

- (a) Variac
- (b) Slider

[[diagram]]

[[diagram]]

No Bridged contacts

[[NB11-093]]

Back Cover