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An Automatic data editing and switching system

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ABSTRACT. The paper describes an equipment developed for selection and switching of meteorological messages from the trunk circuit to the subsidiary circuits. The equipment scans different characters present in the designator of a message using World Meteorological format, by comparing the pulses in the characters of International alphabet 2 with the pulses generated in the equipment and filters data according to pre-determined programme.

The basic circuitry of the equipment comprises of a pulse generator or clock, a frequency divider, divider, a comparator and coincidence circuit, a pulse recogniser and a matrix to recognise the character identified.

1. Introduction

The Telecommunication Centre of Meteorological Department at New Delhi has a Message Switching Computer to which all National and International teleprinter circuits are connected. This is a Philips Message Switching System—DS-714. The system receives data from all National and International circuits and also messages fed to it from local circuits. These data are stored into the system and are transmitted on the teletype circuits to five Regional collection and distribution centres, *viz.*, Delhi (Safdarjung), Bombay, Madras, Calcutta and Nagpur on 50 bauds teleprinter circuits. For each of these circuits, a programme is incorporated in the system (DS-714) so that the computer relays to each circuit, the data of its requirement. But each of the above regional stations, being a Regional relay centre, has several ciruits connected to it, and ordinarily the data received at the centre are relayed in full to their subsidiary circuits. With this arrangement considerable amount of unwanted data are transmitted to the subsidiary circuits resulting in loss of circuit time, wear and tear of teleprinter machines and waste of teleprinter (T/P) stationery. For utilisation of data at subsidiary centres, the required data need to be sorted out from a large amount of unwanted data.

1.1. Regional centres have to analyse the meteorological data for a fairly large area. To quote one such requirement, Meteorological Office, Safdarjung, New Delhi (SFD) needs both synoptic and upper air reports from the whole of India, Afghanistan, Bangladesh, Burma, Malaysia, Middle East countries, Nepal, Thailand and a portion of USSR (Block 38 only), while it does not require information for 09, 15 and 21 GMT from International reports and all messages pertaining to aviation. But such messages are routed on the national network connected to DS-714 for meeting the requirements of certain other centres. The subsidiary circuits connected to SFD, have varied requirements, as their analysis is confined to a smaller area. For example, Meteorological Office, Jaipur, , a subsidiary circuit to SFD, does not require any report from Thailand, Singapore, Malaysia, Sri Lanka, a portion of USSR and also no reports of 09, 15 and 21 GMT. The equipment weed out these unwanted data received from DS-714, both for Regional centre and its subsidiary circuits.

The contents of the transmission of meteorological data from DS-714 at Delhi to the Regional Centre SFD and its subsidiaries are given in Appendix-I. The plan of various circuits branching from different regional relay centres is shown in Appendix-III.

1.2. The first equipment has been developed to meet the requirement of Meteorological Office at Safdarjung (SFD) and the subsidiary circuits connected to it. As all these subsidiary circuits are connected to SFD, it was felt necessary to develop an ancillary switching equipment and

programme it to meet the requirement of the individual circuits. This equipment interfaces the input to SFD from computer and the subsidiary circuits originating from this centre. The equipment has been tested fully for about 700 hours without any malfunctioning.

1.3. *The system performs the following functions*

(*i*) It weeds out unwanted messages from computer transmissions.

(*ii*) It edits reports from a collective and passes only the data required by the station.

(*iii*) Addressed and administrative messages are sensed and diverted to the addressee only.

(*iv*) During the free period of a circuit, local messages kept on an auto-tape dispenser, are automatically transmitted.

(*v*) At the end of the transmission of local messages the equipment automatically changes the circuit to transmission from the computer.

(*vi*) It automatically stores required data for a circuit out of incoming data from computer when local transmission is on, to avoid loss of data. These data can be cleared to the concerned station during any free spell.

2. Principle of operation

The selection mechanism senses the characters in the abbreviated heading of a message or the station index of the coded report in a message. For addressed messages the equipment senses a special four letter code designating the destination (specially introduced) and relays it to the particular station. The equipment also senses the end of the message 'NNNN' and stops the functioning in order to have fresh selection during receipt of the next message.

2.1. *The meteorological message has the following format*

(a) Heading : TTAA ii CCCC YYGGgg

Where, TT—data designator

AA—geographical designator

ii—Number to differentiate two or more bulletins which contain data in the same code and which originate from the same geographical area and the same originating centre

CCCC—International location indicator

YYGGgg—International date-time group

The heading is followed by the text of the messages and its content. The type of information contained in a message is indicated by data designators like SM for synoptic report (main hours), SI—synoptic report (intermediate hours), UP—Part A Temp., UG—Part B Temp. etc. The content is the data in coded form preceded by Block Number and Index Number of a station. The end of a mssage is signified by NNNN.

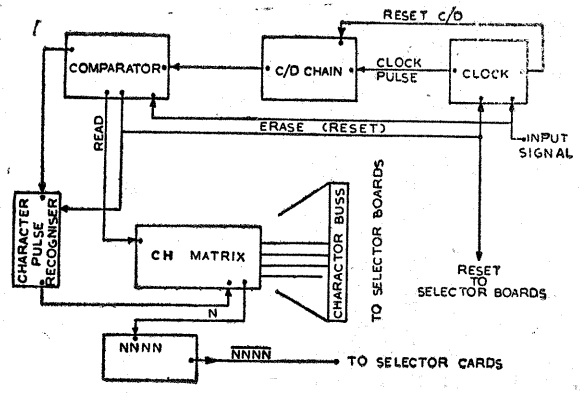


Fig. 1. Blocks diagram upto Character recognition

2.2. The equipment senses TTAA, YYGGgg, data designators SM, SI, UP, UG etc, Block and Index Numbers of stations and NNNN to start or stop its functioning. The designators used in this paper and their meaning are given in Appendix II.

3. Description of circuitry

The system operates on the principle of comparing the incoming pulses of the received signal with the pulses generated by a built-in clock, to recognise a character. The clock starts on sensing the *start* pulse of a character and ceases on receipt of the *stop* pulse of the character. This enables the clock to start afresh for every character avoiding any cumulative error, due to a slight variation in the speed of the incoming signal. The clock output is fed to a countdown chain to derive pulses of equal duration, comparable to 50 bauds. The clock resets the countdown chain for every character. The frequency of the clock is kept at 200 Hz.

The equipment has the following components:

(1) A clock unit
(2) A countdown chain
(3) A comparator
(4) Character recogniser
(5) Character Matrix
(6) Selection sub-units

Flip flop circuits with transistors are extensively used for convenience of maintenance (Fig. 1).

The clock starts on recognising the *start* pulse of the signal. These pulses are divided into five equal pulses having a duration comparable with that of 50 bauds speed by a countdown chain.

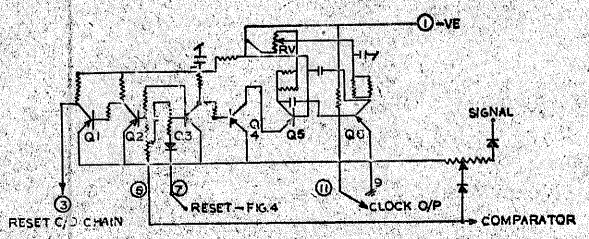


Fig. 2. Pulse generator (Clock)

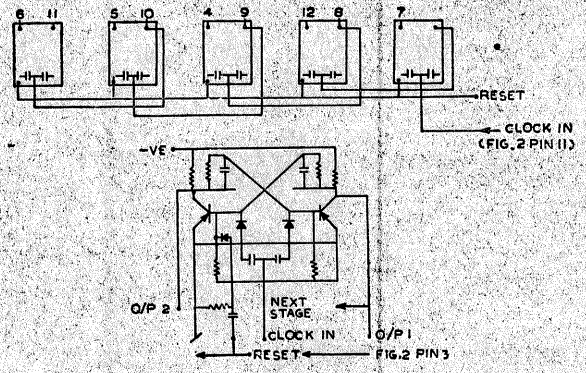


Fig. 3. Count down chain 4, 5, 6, 7, 8, 9, 10, 11, 12 extended to Comparator (Fig. 4)

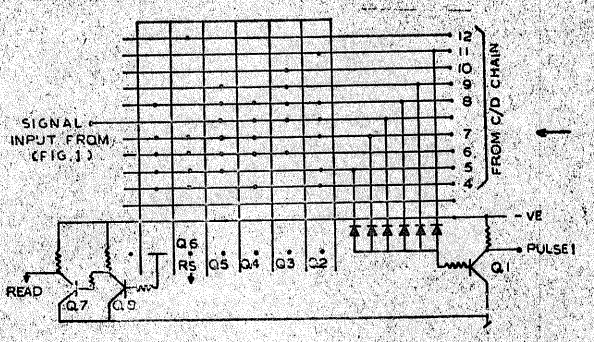


Fig. 4. Character pulse recogniser

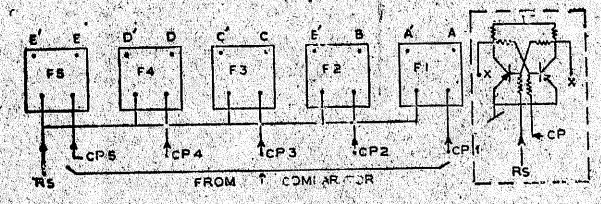


Fig. 5, Comparator and coincidence circuit

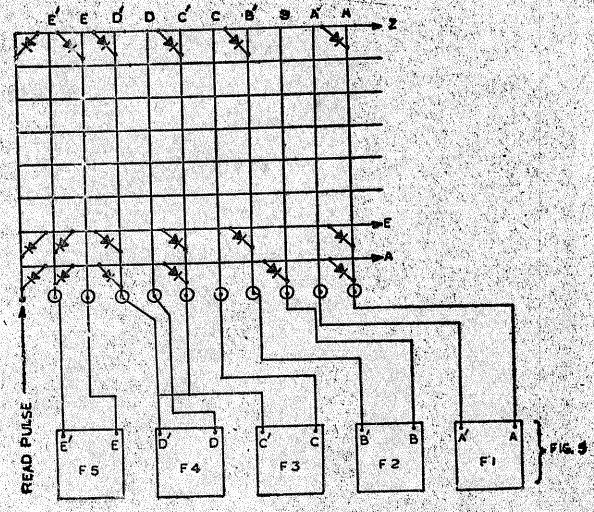


Fig. 5(a). Character matrix

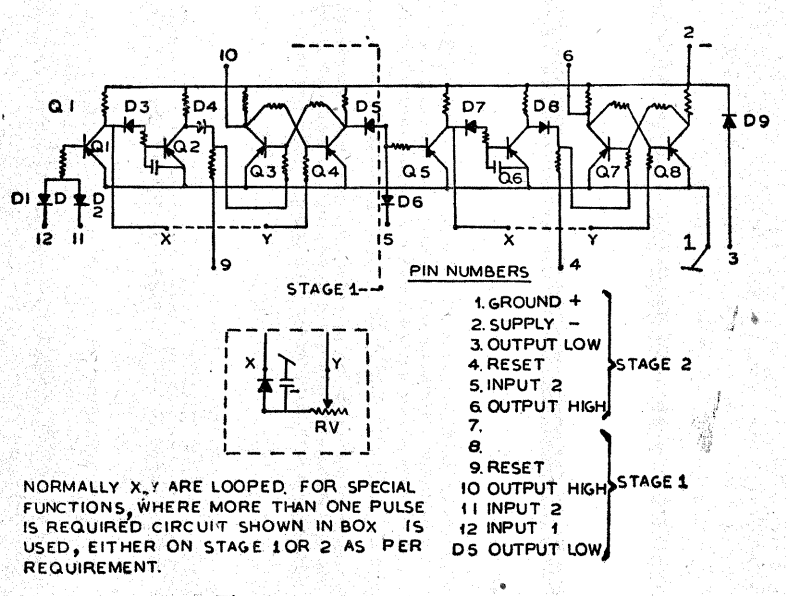


Fig. 6. General type selector cards

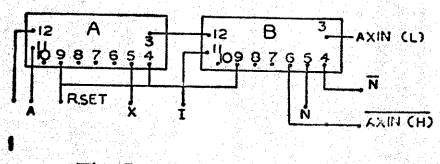


Fig. 7. NNNN generator

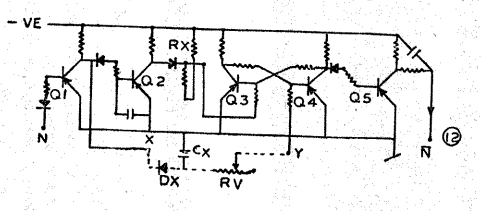


Fig. 8. Selection of axin pin position as shown in Fig. 6

The clock is stopped by the stop pulse of the character. The pulses derived from the divider are passed to a coincidence circuit and compared with the incoming signal in the comparator to differentiate the polarity of the received pulses of the character. The output obtained is sent to a character recogniser which consists of five independent bistables whose output changes in correspondence with the applied pulses from the comparator. This gives ten output pulses for each character. These are applied to a diode matrix to derive the correct character selected. The comparator in addition to five character pulses generates a write (read) pulse and an erase (reset) pulse to write and erase the character stored. All the characters derived from the matrix are terminated on a buss. These individually derived characters are used to operate the selection sub-unit. After the recognition and selection as per the programme, the selector card provides two outputs, a *low* (zero) and a *high* (one) for further utilisation. Normally the switching code contains four characters. Two selector cards are used to recognise and identify the switching programme. The output obtained from the selector card is passed through relevant gates to initiate the final switching.

3.1. *Clock*

The clock consists of six transistors Q1, Q2, Q3, Q4, Q5 and Q6 (Fig. 2). The *start* pulse of the character is fed through D1-Rx-D2 to the base of Q2. This enables Q1 to generate a pulse which is used for resetting the divider chain. Q2 also starts the multivibrator Q5-Q6. The output pluse of the multivibrator is fed to the divider.

When the *stop* pulse of the character is received, the erase pulse generated by the comparator, which is connected to the base of Q3 normalises Q2 and stops the clock. Thus, with each character, the clock is made to start and stop to avoid any cumulative effect of any drift of the clock, if it occurs, and also to maintain synchronisation with the incoming signal. Provision is made to adjust the frequency of the clock to synchronise with the incoming signal with the help of RV and is capable of operating at a speed of upto 75 bauds.

3.2. *Divider*

This is a conventional frequency divider (Fig. 3). The different outputs taken from the divider are utilised to derive the required staircase pulses for the operation of the coincidence circuit.

3.3. *Comparator*

In the comparator, the incoming signal pulses are compared with the derived staircase pulses to obtain a coincidence to derive a pulse from the collector of Q1—the first character pulse (Fig. 3). Likewise Q2, Q3, Q4 and Q5 derives

the second, third, fourth and fifth pulses of the sensed characters. Q8 and Q6 operate during the period of the character *stop* pulse and give out the *read* and *erase* pulse respectively.

3.4. *Character recogniser*

The pulses from Q1 to Q5 (Fig. 4) are fed to five independent flip-flops F1 to F5 (Fig. 5). The flip-flops changes state when a pulse is applied to it. For example, when character *Z* is recognised (10001) only F1 and F5 will change state. The ten outputs available are taken to form a diode matrix. The matrix diodes are arranged to give a *low* for the character selected. In the above selection, if 5 diodes are connected to A B′ C′ D′ E, the output of the matrix will run *low* (Fig. 5-A). The sixth diode is connected to the *read* pulse which is normally on *high*. As seen earlier, after recognition of five character pulses by the comparator, the *read* pulse becomes *low*. At this instant a *low* output is recorded at the output of the matrix. The *low* thus obtained is used to trigger the *selector* cards. The *erase* pulse which immediately follows, is used to reset (erase) the character recognising flip-flop and also for other reset operations.

3.5. *Selector Cards*

Most of the selector cards are indentical except for a few special types for specific transfer functions (Fig. 6). The general purpose selector cards have two identical circuits mounted on a printed circuit board. These two stages can either be operated individually or together for adding two characters.

The first stage consists of D1, D2, Q1, D3, Q2, Q3, Q4 and D4 and the second D6, Q5, D7, Q6, D8, Q7, Q8 and D9. The diode D5 is used as a coupling between stages 1 and 2.

Consider that the designator AXIN is to be selected for some switching operation. This requires two selector cards to add up the four characters involved. The output from the matrix, for *A* and *X*, are tied to pin 12 and pin 5 of the first card (Fig 7). Pins 9 and 4 are given to the Reset pulse. As *A* and *X* applied to pin 12 and pin 5 are on *high* during preselection period, Q1 and Q5 are contained to the ground. When *A* goes *low* on selection, Q1 triggers Q4 and also drives Q2 through D3 grounding the Reset pulse. The triggered Q4 runs to ground momentarily unclamping Q3. The release of Q3 applies a bias to Q4 to maintain conduction. This registers a *low* on D 5 and a *high* on pin 10 (Collector of Q3) representing the *store* of *A* on two levels. When *X* is selected, D6 runs *low* and D5 on *low* already by previous selection enable the triggering of Q5 and an identical operation like that of the previous stage occurs. (Immediately on recognition of *X* the previous stage gets erased by the Reset pulse making D5 (*high*). This allows the Store of '*AX*' registered as *high* on pin 6 (collector of Q7) and as *low* on pin 3 (collector of Q8).

The second card is used for adding *IN* to *AX*. Pin 3 of the first card is connected to pin 12 of the second card and pin 11 to character *I*, pin 9 to Reset and pin 5 to character *N*. When *I* goes *low* on selection, D5 goes *low* storing *AXI* and the previous selection *AX* gets erased. On recognition of *N*, *AXIN* gets stored as *low* on D 9 of the second card and a *high* on pin 6, and the previous stage is erased by the *reset* pulse. Depending on the design requirement either *high* or *low* can be used for further operation. To clear the locked *AXIN* a predetermined pulse of a *high* amplitude should be applied to pin 4 of the second card. The selector cards are a versatile basic board and by a diligent use of two or more cards, any complex switching can be performed.

The bulletin end signal NNNN is made use of to normalise the locked selection cards by applying it to pin 4 or to pin 9 as the situation demands.

3.6. *NNNN Identifier*

This uses a half of a general-type selector card (Fig. 8) with an additional circuitry-DX, CX, RX and Q5. The circuit is set by RV such that four consecutive pulses from Q1 offer a proper trigger pulse to make Q4 to conduct. This applies a *low* to Q5 and raises the output on pin 12 to *high*. RX helps self resetting. The pulse derived from pin 12 is used for unlocking the selector cards.

3.7. *Identification of D* 09, 15 *and* 21 *GMT*

This is done by a set of 5 selector cards. For this purpose the scanning is done to identify the synoptic indicator MMXX, an intervening character *space* and *date* and *time* group. As date is a variable factor, a special *permutator* card is used. This is a transistor OR gate having 11 character input (0 to 9 and X) and a single output.

To identify, say, 09Z of 15th, following transfers take place (Fig. 9a). Card *A* is tied to M and X as discussed earlier. When MMXX is recognised, pin A3 which is tied to Pin B12 goes *low*. When character *space* (≥) is sensed on B 11, the first stage of B delivers a low on D5. (general-type selector cards) and a *high* on pin 10 erases card *A*. The *low* on D5 represents MMXX≥. The second stage of *B* functions to recognise the date (which can run from 01 to 31). Hence pin B5 is connected to the output of the permutator gate mentioned above. This stage will trigger only when two pulses are given to it representing the two digits of the date. This allows B-D 9 which is jumpered to pins C12,

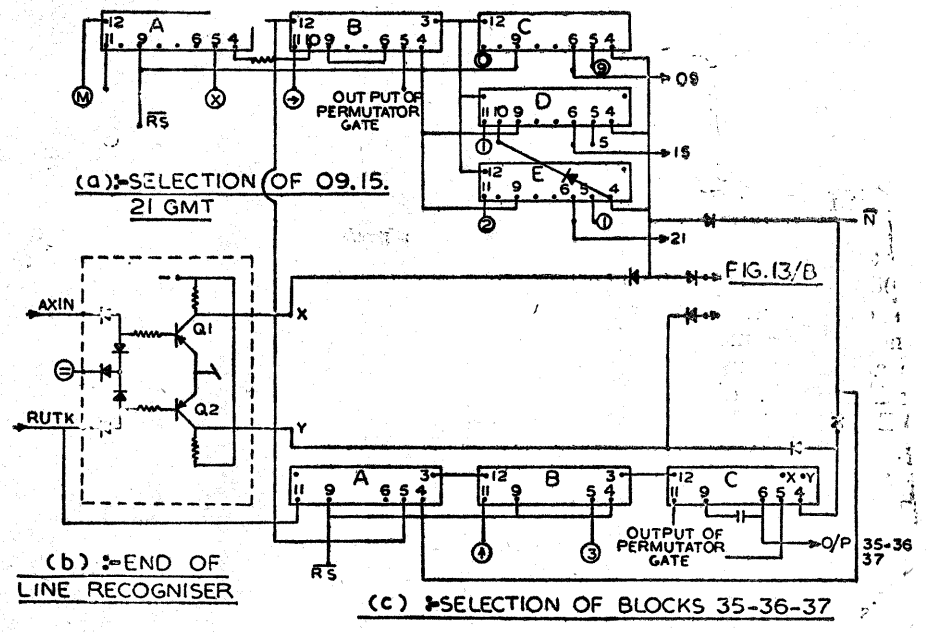


Fig. 9 (a-c). Selection of 09-15-21 GMT and blocks 35-36-37

D12 and E12 to run *low*, storing *MMXX* ⩾ 15. Cards *C*, *D* and *E* are for identification and selection of 09, 15 or 21. Pins C11 and C5 an tied to characters 0 and 9 respectively. When character zero is identified C-D5 runs low storing MMXX ⩾ 150 (at this stage any character other than 9 will cancel out the store. When the next character '9' is registered, pin C3 attains a *low* and pin C6 a *high*, representing the store of MMXX ⩾ 1509 and the earlier selection gets erased. The *high* on pin C6 is used for switching. When NNNN is received (pin C4) the selection gets unlocked and normalises the switching gate. In the same manner, selection of 15Z-21Z is done by cards *D and E*.

3.8. *Editing of synoptic reports of Blocks* 35, 36 *and* 37

As bulletins from RUTK contain reports from Blocks 35, 36, 37 and 38, some links require deletion of reports other than that of Block 38. Hence, an unique method is adopted by using 3 selector cards to edit the reports blockwise, by scanning the starting of each line. By slight extension of the circuitry editing index-wise also could be accomplished (Fig. 9C). *A, B* and *C* are the 3 selector cards where *A* and *B* are general-type cards and *C* is of a specified type. In addition, an ancillary circuit enables scanning of the beginning of each line.

Pin A12 is tied to RUTK and pin A5 to pin A3 of Fig. 9a. When both RUTK and MMXX go *low*, pin A3 attains a store of RUTK MMXX. The conventional figure shift signal before the beginning of a data line is given to pin B11. When character 3 registers on pin B5, pin B3 and pin C12 go *low* registering RUTK MMXX⩓3. To make a positive identification of the next character which can be either 5, 6 or 7, an index permutator trans-gate is made use of to give a *low* output on receipt of either one of these figures. This output is connected to pin C11. For instance, when character 6 is recognised, C-D5 changes to *low* storing RUTK MMXX⩓36. The second stage of C is wired to take 3 consecutive pulses before getting triggered, to enable the station index number to get registered. Therefore, the pin C 5 is extended to the 11 input permutator gate mentioned earlier. For example, when station index 568 is received, the output on pin C 6 (*high*) indicates the store of RUTK MMXX ⩓ 36568, and is made use of for further operation. Before the scan of the next line, the earlier lock is released when the report and signal '=' is received. This is done by an AND circuit (Fig. 9B), ,which sends out a pulse to pin C 4 when both RUTK and '=' go low. As RUTK is already kept low, whenever '='is received, a Reset pulse will be applied to pin C4. In the absence of either 35, 36 or 37 at the start of the report preceded by a figure shift signal, no switching will take place. The editing will be operative even during the transmission of 09/15/21 GMT to those circuits to which the bulletin is open. On receipt of the bulletin end signal all the locked selector cards will be normalised.

3.9. *Editing of Upper Air Observations*

This operation is done by a set of five non-interchangeable selector cards. To identify whether the report is of Temp. or Pilot, a special

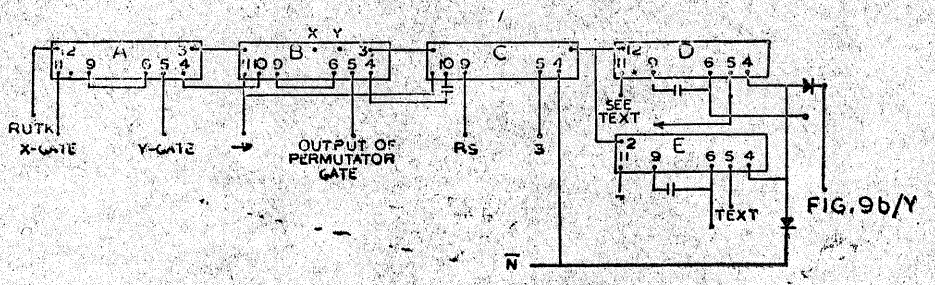


Fig. 10. Upper air editing of blocks 35-36 and 37

OR gate (X-gate) like the one mentioned earlier-is used to which P and T are tied. To detect other indicators in the group, another OR gate (Y-gate) with *A, B, C,* and *D* tied to it is used (Fig. 10).

Let us consider an example of transmission of a Temp. message which has the text starting with TTAA ⩾ 11121 ⩾ 35700.

Pins A12 and A11 are connected to RUTK and the X-gate. On recognition of RUTK and TT, A12 and A11 go *low*. (This effects storage of TT on the first stage of *A*). When AA is recognised from the Y-gate on pin A5, pin A3 registers a *low,* storing TTAA. B11 is on character *space* and B5 is on to the output of 11 input permutator gate. When ⩾ is received the first stage of *B* stores TTAA. The second stage will trigger only when 5 pulses are supplied to it. Therefore, when five pulses are supplied, representing 11121, pin B3 stores TTAA ⩾ 11121 and on receipt of the next space signal the first stage of *C* will store TTAA ⩾ 11121 ⩾. On registering character 3 on pin C5, storing on pin C3 TTAA ⩾ 11121 ⩾ 3. This is extended to pins D12 and E12. Pin D11 is connected to an OR gate to which characters 5 and 6 are tied. So when character 5 is presented to pin D11, the first stage stores TTAA ⩾ 11121 ⩾ 35. The second stage is wired to trigger on three pulses and wired to the 11-input gate. When the index 700 is received, pin D6 acquires *high* storing TTAA ⩾ 11121 ⩾ 35700. This reference from pin D 6 is taken for subsequent switching. Card *D* completes recognition of blocks 35 and 36, while card E recognises block 37. None of the links, as per programme, require blocks 35 and 36 while block 37 is required by at least one link. The end signal of the report normalises the card before the start of the fresh report. This pulse (Fig. 9b/y) applied to pin D4 or pin E4, is obtained from the source, which have already been mentioned in section 3.8 synoptic editing. It should be noted that switching of one stage automatically resets the previous stage.

3.10. *Editing of surface retard composites*

In a retard composite when synoptic reports of different hours are reported, each report is expected to start with MMXX YYGG and end with the report ending sign. If the above is adhered to, it becomes simpler to edit and supply the required reports only, by sensing MMXX YYGG as has been done in the case of 09/15/21 GMT (Fig. 9a). In the present context, once selected it not only has to be cleared by NNNN but also by '=' to enable scanning afresh every line, which would be the only way to give effective editing.

To obtain an effective normalisation when '=' is received the designators AXIN and SXIN (which is also used sometimes) are made use of along with '=' to give a pulse. A pulse pump is operated when either AXIN or SXIN is *low* and at the instant when the associated report ending sign '=' also *low*. The derived pulse is given to pin 4C, 4D and 4E of 09/15/21 GMT editing cards (Fig. 9b/x).

3.11. *Selection of Addressed messages*

This operation is outlined in Fig. 16. As the cards involved in this operation are of the general-type, and the selection obtained is akin to the selection of AXIN earlier, it is not dealt with in detail. To evolve a simple circuit, all the links connected to the unit have been allotted a four-letter address code, DHSF, DHPL, DHJP, DHLK, DHSN and DHCH representing Safdarjung, Palam, Jaipur, Lucknow, Srinagar and Chandigarh respectively. DH indicates the routeing centre and the other two letters denote the addressee. The necessary selection is obtained from cards A to G. These cards, all being of the general-type, the selection sequence is not explained.

Card A is wired to lock on recognition of DH in sequence. When this is sensed, pin A3 stores DH and jumpered to it are pin 12 of cards B, C, D, E, F and G. The *high* obtained on selection from pin 6 of the concerned card is taken for switching.

A portion of the *high* is made use of to lock the defence circuits originating from the relay centre, to bypass the addressed messages from them, as these messages are intended for the consumption of departmental offices only.

All outputs are taken out through feed-through sockets for further processing.

After the derivation of the programmed codes, a prompter circuit takes the decision to keep the

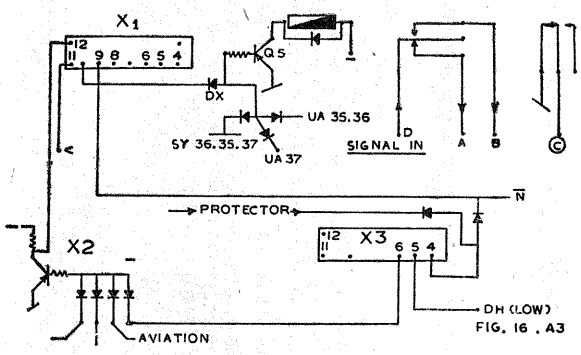


Fig. 11. Prompter and associated gates

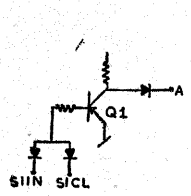


Fig. 12. National synop identifier

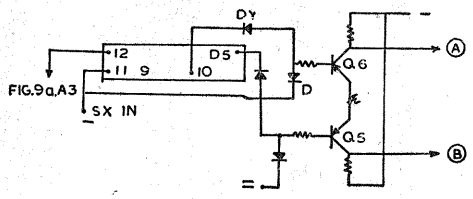


Fig. 13. Identification—R/F report or composite (A) end of line recogniser (B)

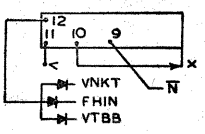


Fig. 14.

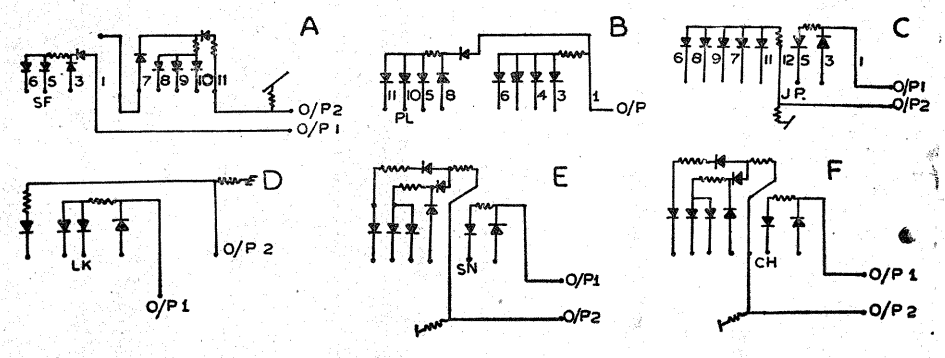


Fig. 15. Switching gates (A) SFD (B) PLM (C) JPR (D) LKN (E) SNR (F) CHG

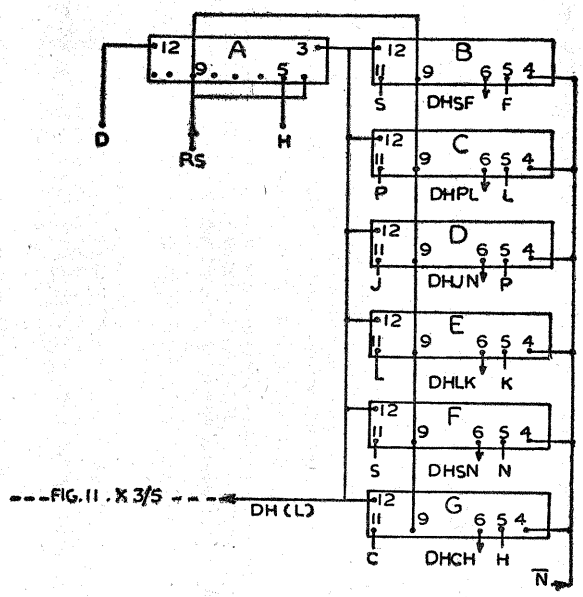
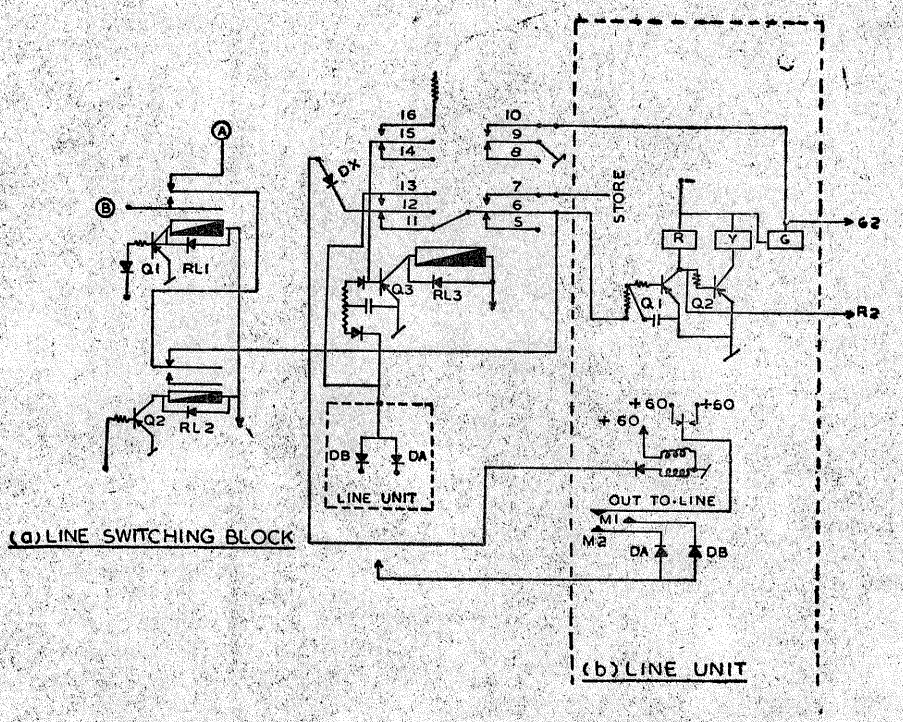


Fig. 16. Selection of addressed messages



Figs. 17(a-b). Line switching block and line unit

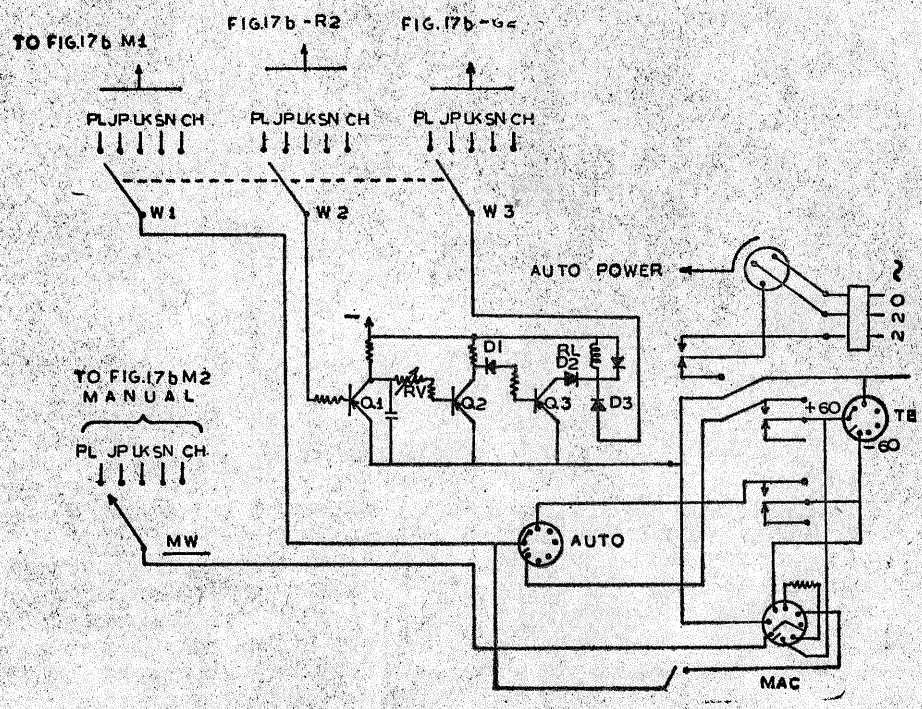


Fig. 18. Automatic local transmit system

switching condition to the minimum to avoid strain on power supply unit and also to enable the full preamble to reach all the recipients to know the status of their circuit.

The fore-end of the prompter is a single stage selector card which operates a multi-contact relay on swiching. By adopting different configuration, the outgoing signal from the master relay is diverted to the swiching blocks. In addition, it aids the operation of different switching gates (XI in Fig. 11). The operation of the prompter is aided by two ancillary gates X2 and X3.

Selection of SIIN-VTBB-VCCC-FHIN involve using of general-type selector cards and hence this is not dealt with in detail.

3.12. *Identification of National GMT reports* 09/15/21

Some links need national reports and not international reports. A recogniser circuit helps in evolving the necessary permutation (Fig. 12). The output from SIIN and SICL are given to Q 1. When either one of them appears, the respective gate is grounded making the switching block passive.

As circuits SN, JP and CH do not require any bulletins from VTBB-VNKT and FHIN to economise on gates, a three to one gate is made use of (Fig. 14). In addition to a general-type selector card, a commuting transistor is made use of. When the reference signal is applied to D1, though *low*, Q1 is kept active by < on D2. After the transmission of the whole line (*say*, SITH VTBB 130210 and carriage return) the stage gets switched. The output obtained on pin 10 is supplied to the relevant gate. This enables the full preamble to pass through before any switching takes place.

3.13. *Final switching*

For the final switching of Line blocks (LSB), six separate gates are provided (Fig. 15). Each gate has two sections and two outputs. One output operates the auxiliary switching function of LSB and the second is used for addressed messages switching. Gate A in Fig. 15 is the gate for DHSF. One section consists of diodes 7-8-9-10 and output 2 and the other diodes 5-3-6 and output 1. Diodes 8-9-10 are lined up with the switching reference of 09/15/21 GMT. Appearance of any reference will give an output on Output 2.

DHSF does not require International 09/15/21 GMT. It is, therefore, necessary to ground diodes 8 or 9 or 10 for getting national data of the above hours and unground it for international This is achieved by diode 7 connected to the recogniser (Fig. 12). When SIIN or SICL is selected diode 7-gets grounded.

When addressed messages are sent, DH is selected (Fig. 16) and fed to pin 12 of B, C, D, E, F, G and also to the prompter gate X3 in Fig. 11 to keep the prompter on standby. When SF appears, it is applied to diode 5 of the gate A in Fig. 15, but the output of the gate is kept *low* due to grounding of diode 3 by the prompter XI in Fig. 11. When basket return signal is received after the address line, the prompter (*i*) lifts diode 3, off the ground and also transfers the input signal to B and (ii) simultaneously activates LSB of DHSF while other LSBs are kept passive.

The principle of operation of other gates is identical.

Designator SXIN is used for retard collectives and also for reporting rainfall total. DHPL does not require rainfall reports, but do require retard which are being received under that designator.

Fig. 13 shows the circuitry which decides the operating mode. The first stage is of general type to which Q5 and Q6 are added. When SXIN is selected, the reference obtained is given to pin 11 and to Q 6 through DX. Pin 12 is tied to MMXX (Card A in Fig. 9a). When SXIN is selected, the derived *low* on pin 11 goes *low*, so also does DX. This releases Q6 and applies a switching reference to diode 3 of gate B in the Fig. 15 and thereby cuts off Palam. If the text starts with MMXX, pin 12 also go *low* and this stage becomes active. The *high* obtained on pin 10 of this stage drives Q 6 through DY, unlocking DHPL.

3.14. *Line Switching Blocks*

A switching block effects various and final switching functions (Fig. 17a). The two stationary contacts of RLI (Relay 1) are connected to the *A* and B output of the prompter (Fig. 11). Output 1 of the concerned switching gate to LSB is connected to Q 1, for switching addressed messages. Q 2 operates RL 2 from Output 11 (OP/2) of the concerned gate. Q 3 (RL 3) functions while local transmission from the relay centre is made.

When local transmission is made either through DA or DB, Q 3 conducts and (*i*) the output line DX changes over to contact 13 allowing the concerned local signal to reach the output line, (ii) contact 9 by mating with 10, switches the Green lamp ON, (iii) changing of contact 6 diverts the main line signal to STORE position and (iv) if no local transmission is sensed for more than ten seconds, RL 3 reverts to normal condition.

3.15. *Automatic local transmission system*

The electronics for this purpose is in an ancillary unit coupled to the main system (Fig. 18). To select the output and also to operate either automatic or manual transmission, two three-Waffer ganged rotary switches are made use of (W 1, W 2, W 3 and MW) while MW is used for manual work. For automatic operation, a Siemens automatic Tape Dispenser (T/D) modified to work with this system is used. The T/D is kept loaded with the message tape and kept on standby by keeping the START button depressed. If the concerned circuit becomes free, when the mainline messages are eliminated from the circuit, and stays the circuit for a period of about 60 seconds, the T/D will automatically transmit the tape to the station to which it is kept oriented. If the main line traffic continues to be absent for a period of about ten seconds after the end of the T/D transmission, the circuit will revert to NORMAL. Before reverting, if the mainline is switched into the circuit, it

would be diverted to STORE and the circuit will get normalised when the end of bulletin is sensed. A special sensing circuit whose reference is applied to pin 16 of LSB safeguards (Q 3 of Fig. 17a), the circuit from being normalised before the 'end of bulletin' signal is sensed from computer transmissions.

Acknowledgement

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APPENDIX I

Contents of transmission of meteorological data from DS-714 to the regional centre SFD and its subsidiaries

Name of station	Requirements	Elimination
Safdarjung	1. All national and Sri Lanka data of 00, 03, 06, 09, 12, 18 and 21 GMT surface/upper air data.	1. International data of 09, 15 and 21 GMT.
		2. Routine Tafs.
	2. All surface and upper air data of 00, 03, 06, 12, 18 GMT in respect of 38, 40, 41 and 48 blocks.	3. Metars.
		4. Airep messages.
		5. Bangladesh fleet forecast.
	3. APT Bulletin.	6. No data of surface and upper air in respect of 35, 36 and 37 Blocks.
	4. All regional Inferences/IWB/ INOSHAC bulletin, Bay Inference and Pakistan and Bangladesh Inferences.	
	5. Thermal wind, U.A. and surface analysis.	7. Adminsitrative messages not for SFD.
Palam	1. All national/Sri Lanka data of 00, 03, 06, 09, 12, 15, 18 and 21 GMT surface and U.A. data.	1. Surface analysis. 2. Seasonal rainfall totals.
	2. All data surface/ upper air of 00, 03, 06, 09, 12, 15, 18 and 21 GMT in respect of Blocks 38, 40, 41, 44, 48, 55, 56, 63 and upper air data of 37 Blocks.	3. Administrative messages not for Palam.
	3. APT Bulletins.	
	4. All regional Inferences/IWB/ INOSHAC bulletin/ Bay Inference and Pakistan, Bangladesh Inferences.	
	5. Thermal wind, U.A. analysis.	
	6. Routine Tafs.	
	7. Routine Metars.	
	8. Aireps	

Name of station	Requirements	Elimination
Lucknow	1. All national data of 00, 03, 06, 09, 12, 18 and 21 GMT surface and upper air.	1. National/International data of 15 GMT.
	2. All data surface and upper air of 00, 03, 06, 09, 12, 18 and 21 GMT in respect of 40, 41 and 48 Blocks.	2. Routine Tafs. 3. Metars. 4. Airep messages. 5. Bangladesh fleet forecast. 6. Thermal wind.
	3. APT bulletins.	7. No data of surface and upper air in respect of 35, 36, 37 and 38 Blocks.
	4. All regional Inferences/IWB/ INOSHAC bulletins, Bay Inference and Pakistan and Bangladesh Inferences.	8. Administrative messages not for Lucknow.
	5. Upper air and surface analysis.	
Jaipur	1. All national data of 00, 03, 06, 12 and 18 GMT surface and upper air data.	1. Data of surface/ upper air in respect of 35, 36 and 37 blocks. 2. Data of Sri Lanka.
	2. All data surface/ upper air of 00, 03, 12 and 18 GMT in respect of 38, 40, 41 Blocks.	3. Airep messages. 4. National/International data of 09, 15 and 21 GMT. 5. Routine Tafs. 6. Metars.
	3. APT Bulletins.	
	4. All regional Inferences/IWB/ INOSHAC bulletins, Bay Inference and Pakistan Inference.	7. Administrative messages not for Jaipur.
	5. Upper air and surface analysis.	
Srinagar and Chandigarh	1. All national data of 00, 03, 06, 09, 12, 18 and 21 GMT. Surface and upper air data.	1. National/International data of 15 GMT. 2. Tafs. 3. International data of 21 GMT.
	2. All surface and upper air data of 00, 03, 06, 09, 12 and 18 GMT in respect of 38, 40 and 41 Blocks.	4. Metars. 5. Aireps. 6. Auroral observations. 7. No data in respect of 35, 36, 37, 44 and 48 Blocks.
	3. APT Bulletins.	
	4. All regional Inferences/IWB/ INOSHAC bulletins, Bay Inference, Pakistan Inrence.	8. Administrative messages not for Srinagar/Chandigarh

APPENDIX II

Abbreviated switching designators

ASIN	Surface analysis India
AUIN	Upper Air analysis India
AXIN	Retard and other data India
FHIN	Thermal wind report
FTIN	Aviation messages
MMXX	Surface observations
PPAA, PPBB, PPCC, PPDD	Pilot observations Parts A, B, C and D.
RUTK	Location Indicator for Tashkent Centre (USSR)
SAIN	Aviation messages
SICL	Synoptic report of Intermediate hours from Sri Lanka
SIIN	Synoptic report of Intermediate hours from India
SXIN	Retard and other data India
TTAA, TTBB, TTCC, TTDD	Upper air observations Parts A, B, C and D
UAIN	Aviation messages from India
UAPK	Aviation messages from Pakistan
UABM	Aviation messages from Burma
VCCC	Location Indicator for Colombo (Sri Lanka)
VNKT	Location Indicator for Kathmandu (Nepal)
VTBB	Location Indicator for Bangkok (Thailand)
⩥	Symbol for character space
⩚	Symbol for figure casing
=	Symbol for end of a report

APPENDIX III