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The ATECO System in Operation

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1. Objective

By introducing ATECO (*A*utomatic *TE*legram switching by *CO*mputer) for their Public Telegraph, Swiss PTT aimed at

- improving the service to customers;
- ensuring the continuation of existing telegraph services;
- making new services available;
- facilitating operators' tasks and improving working conditions;
- reducing operating costs in the long run.

The eleven-month progressive take-on began on 10 May 1971, when the 4,000 telex customers of the Zurich region, the eastern and central cantons, Tessin and the Grisons were given access to the system's printergram positions; it ended on 10 April 1972, when the last of the Gentex countries, viz. Libya, Spain, Czechoslovakia and Hungary, were admitted.

Although a final estimate of the system's performance, by comparison of aims and actual results, can be given only after an extensive period of operation, when the remaining transition difficulties have been overcome, some important conclusions may already be drawn.

2. Reliability of the System

On the whole, the reliability of the system is satisfactory. During the take-on period of more than 8,000 operating hours all three computer chains were working synchronously (triplex) for 4,000 hours, and two (duplex) for most of the remaining hours, the third chain then being mainly used for off-line testing, maintenance, etc.

Although at the trial stage all serious faults had been cleared and the stability of the system proved by extensive local and remote testing, it was to be expected that more flaws and outages would occur during the take-on period. In fact, the system broke down several times because of programming errors and technical defects, which were gradually eliminated however. Most of the total failures occured in the first six months of operation and lasted an average 7.5 minutes each. Subsequent outages have been less frequent, i.e. about twice monthly, and it is hoped that they can be further reduced, if not totally eliminated.

On none of these occasions losses were noted, and the system breakdowns never seriously impaired telegram handling. However, in 7 instances of total failure the messages in the processing queue had to be dropped and recalled from the offices of origin; this was necessary because in each case one particular telegram had caused the outage.

The sophisticated programmes, which comprise more than 200,000 instructions, are working well, and telegrams are processed in accordance with the system specification.

Parallel to the telegraph offices, the Zurich faults service was connected to the system and the technical data of the region's more than 350,000 telephone users gradually read in. So far the requirements of this service have been fully met.

Since 5 March 1972, when the *CO*mputerized *ME*ssage *T*ransmission plant (COMET) of Radio-Suisse Ltd was given access to ATECO, all telegrams between this company and the PTT have been exchanged automatically over the two systems.

3. Operation

3.1 Progressive Take-on of the ATECO System

The fundamental differences between conventional and automatic telegram processing did not allow of parallel operation of the two systems. On the other hand, an immediate changeover at a given date involved too much safety risk, so that the transfer of functions had to be spread over a certain period. This transition procedure also enabled the telegraph offices to gradually make the necessary changes and adapt themselves to the new system. *(Fig. 1* shows part of the new operating rooms of the Berne telegraph office.) For the progressive take-on, which had to be prepared very carefully, a PERT plan with more than 130 activities was drawn up and supplemented by detailed instructions for the telecommunication regions. The timetable comprised the following main stages:

Fig. 1
The new Berne telegraph office. View of the sending positions from supervisor's desk

One (10.5.71–26.6.71):	Access of the telex subscribers of regions Zurich, Geneva, Lausanne, Basle and Berne.
Two (6.7.71–2.8.71):	Progressive take-on of the incoming telegram traffic from Radio-Suisse Ltd.
Three (7.9.71–15.11.71)	Take-on of traffic from the areas served by primary offices Basle, Lugano, Geneva, Lausanne, Zurich and Berne.
Four (1.12.71–10.4.72):	Access of over 800 telegraph offices in 16 European countries.

Each interval was used to evaluate the results of the preceding stage, make the necessary adaptions or corrections and prepare the following stage. The progressive take-on proved to be absolutely essential to the smooth handling of telegrams during the transition period. It also helped to solve promptly and efficiently the technical, operational, programming and staffing problems which differed from stage to stage.

3.2 Access of Telex Subscribers

During stage one, when the telex customers were given access to the system's printergram positions, an extremely high number of prematurely interrupted calls was noted, which led to a temporary overload of the ATECO service positions. The main faults causing these breaks by the computer were:

- wrong composition of answer-back codes;
- incomplete punched-tape ends transmitting combination 32;
- inadmissible repetition of characters (underlining);
- omission or wrong sequence of answer-back codes at the end of messages.

Quite often subscribers did not retransmit their telegrams to the system after being prematurely interrupted. Follow-up action with the customers concerned enabled the number of faults to be substantially reduced within a relatively short time.

At first, considerable extra work was caused by subscribers' subsequent requests for notification of telegram charges. It was decided, therefore, to change the programme and introduce automatic transmission of charges for all telegrams sent into the system by teleprinter. This not only relieves staff at the ATECO centre, but also shows the customer that his message has been well received and passed on.

At present, telex subscribers transmit about 2,000 telegrams daily to the system.

3.3 Take-on of the Incoming Traffic from Radio-Suisse Ltd

The COMET computer installation not yet being completed at that stage, the Radio-Suisse operating centres had to cope with considerable extra work involved in the manual input of their 4,000 telegrams daily. Besides, the format of a large number of telegrams had to be corrected for transmission to the ATECO system. On an average, ATECO rejected 7% of the manual input.

3.4 Take-on of the Swiss Telegraph Offices

On the whole, the take-on of the Swiss telegraph offices (stage three) proceeded as planned. It was found that the input of telegrams requires a high degree of accuracy. Typing errors in the heading, the serivce indications or the address can lead to rejection, misrouting or wrong charging, while incorrect cancellation orders may be ignored and a telegram thus transmitted twice. The consequences of incorrect service indications which completely change the telegram category, in some cases by not being recognized, are particularly embarrassing, e.g. LX for LT, URGENTE for URGENT. Error statistics compiled daily by the computer showed that rejections were most frequent in offices with many inexperienced staff. Towards the end of the take-on period results improved considerably, and today an average 5.5% of the input telegrams have to be rejected.

During the take-on period the programme for the processing of inland press telegrams was expanded in such a way that messages addressed to several newspapers now have to be transmitted to the system only once, the required number of copies being automatically generated and sent out. This alteration has proved extremely useful as it greatly facilitates work in temporary telegraph offices operating during conferences, sports events, etc.

One of the advantages of telegram processing over the ATECO system is the reduction in transmission time. Optimum results, however, can only be achieved if rationalization is extended to the delivery of messages. The ATECO routing facilities provide for the direct transmission of telegrams to telex subscribers (unless otherwise stated in the delivery order) and to all teleprinter-equipped offices of destination, both during and after business hours. In this way retransmission delays can be avoided. Full-rate telegrams for post offices which do not operate teleprinters or provide a delivery service outside normal hours and over the weekend are routed to the nearest telegraph office.

Further improvements in telegram delivery are being considered.

3.5 Access of Foreign Gentex Offices

No major difficulties occured during the progressive take-on of the over 800 Gentex offices in 16 European countries (stage four). The main operating mistakes recorded in that period were:

- incomplete transmission (no end-of-message code/ answer-back code);
- format errors;
- incomplete and incorrect spelling of destinations.

4. Final Remarks

It can be said that ATECO has been smoothly integrated into the Swiss Public Telegraph Service. On the whole, the reliability of the system is satisfactory, and the sophisticated programmes are working well. As expected, it has been possible to reduce telegram transmission time, and simplify operations in telegraph offices and teleprinter-equipped post offices. The new system above all requires exact, disciplined working, and as more experience is gained, the efficiency and quality of service can no doubt be further improved.

Calculations on the number of staff, operators' positions and circuits effected at the planning stage have proved to be fairly accurate.

No major difficulties were encountered in the take-on period.

The system, network structure and peripheral equipment will be periodically re-examined and adapted if necessary.

The present main task is to eliminate the remaining operational deficiencies so that the facilities of the system can be fully used and the service to customers further improved.