Bell Laboratories

AT&T TRIP TO IRAN

FEBRUARY 23, 1975 TO MARCH 1, 1975

SUMMARY

AT&T TRIP TO IRAN

February 23, 1975 to March 1, 1975

Representatives from American Telephone and Telegraph Company, including people from AT&T-195, AT&T-Long Lines, Western Electric Company, and Bell Telephone Laboratories, visited Iran from February 23 to March 1, 1975, at the request of the Telephone Company of Iran and the Minister of Posts Telephone and Telegraph. The purpose of the visit was to gather sufficient information so that it might be possible to write a contract under which AT&T would provide planning, operations, and other possible supports to the development of the Iranian telephone system. The members of the group were assigned the specific areas of investigation for action listed in Figure 1.

Each of the last five people on the list prepared a trip report. Mr. Rickman reported on the policy discussions and, therefore, covered the activities of Mr. Baird and Mr. Bright, as well as his own. Within the other four reports, there will be found a considerable amount of redundancy, since many of the technical investigations were carried out jointly.

Organization charts for the civilian communications organizations are included as Figures 2, 3, and 4, with a second version of the Planning and Management Organization as Figure 5. The latter was included because it is more recent, although less complete, than Figure 4.

A very large part of the technical information gathered came from two particular organizations, the 2M56 Project in the Telephone Communications Company of Iran, and the Planning and Management Organization of the Ministry of Posts Telephone and Telegraph. The 2M56 Organization is assigned responsibility for increasing the telephone system of Iran from its present half million lines to two million lines by the end of the Iranian year 1356 (March 1978). As such, they have been very active in the rehabilitation of the cable plant and in plans for the purchase of electronic switches from General Telephone and Telegraph. The Planning and Management Organization is completing the procurement of the long distance transmission system of Iran, the Integrated National Telecommunications System (INTS), and has been assigned responsibility for long distance transmission as part of the 1356 program.

J. A. McCarthy
April 21, 1975

MEMBERS OF AT&T TEAM

J. A. Baird	AT&T	Policy
R. Bright	WECo	Policy
H. M. Rickman	AT&T-LL	Coordination
R. D. Dalziel	AT&T	Operations
R. C. Harris	AT&T-LL	Transmission
G. Spiro	BTL	Switching, Outside Plant
J. A. McCarthy	BTL	Systems Integration, Plans

Figure 1

MINISTRY OF POSTS, TELEGRAPH AND TELEPHONES
AND
TELECOMMUNICATIONS COMPANY OF IRAN

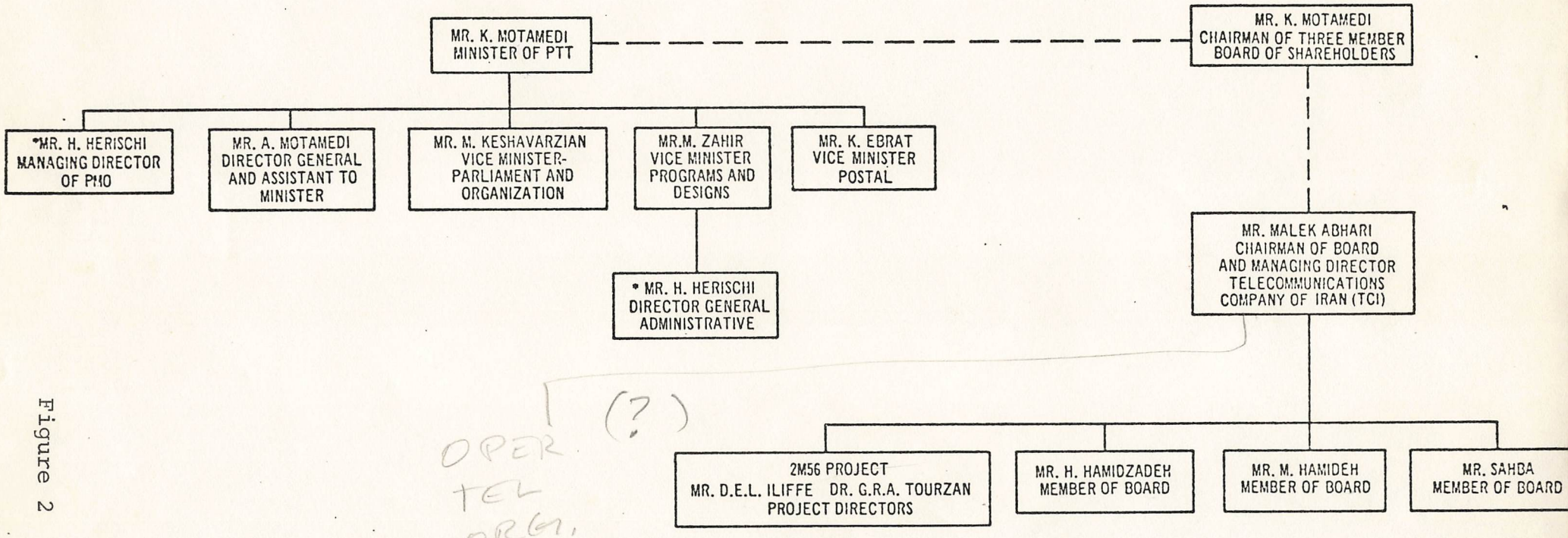
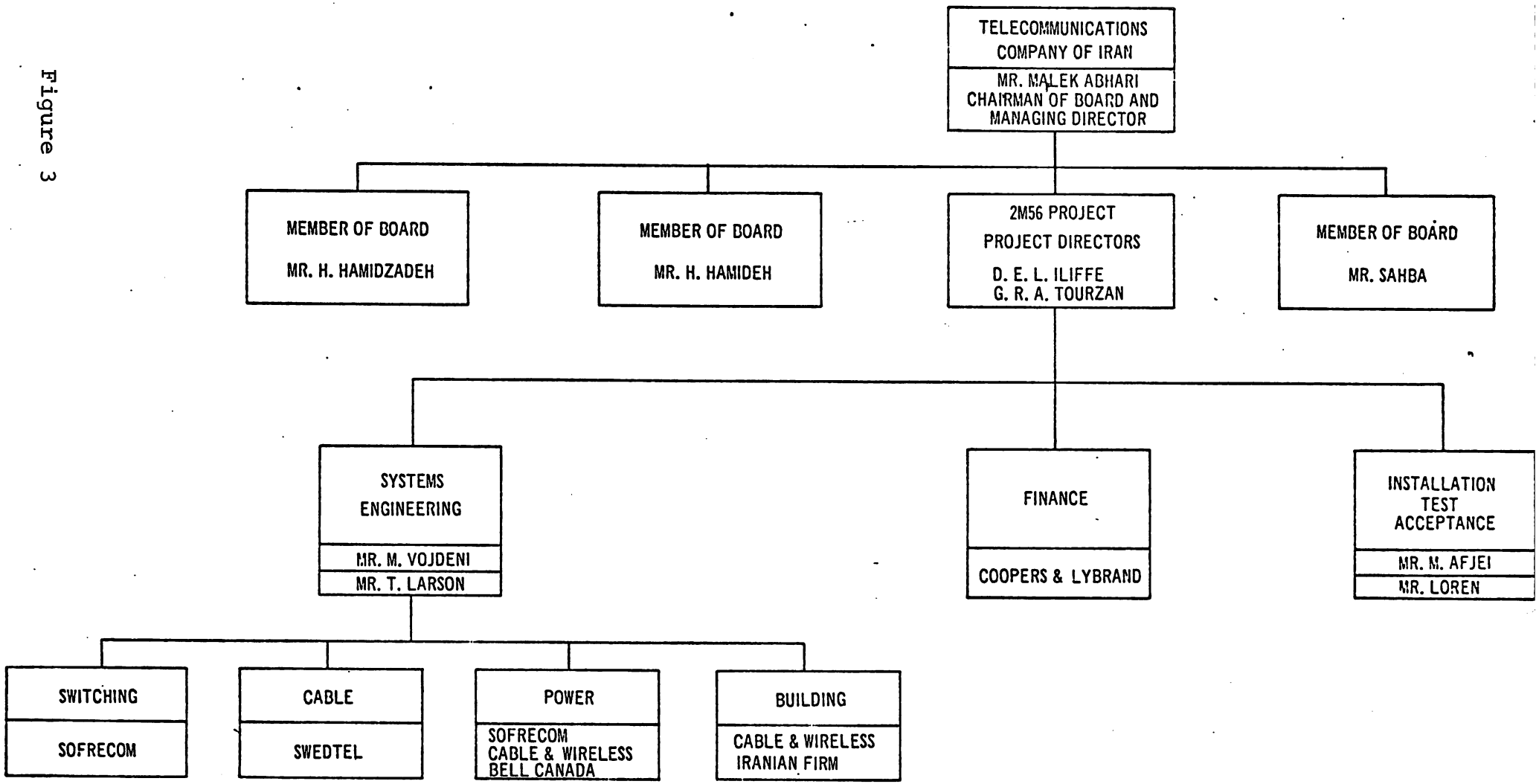


Figure 2

OPER (?)
TEL
ORG.

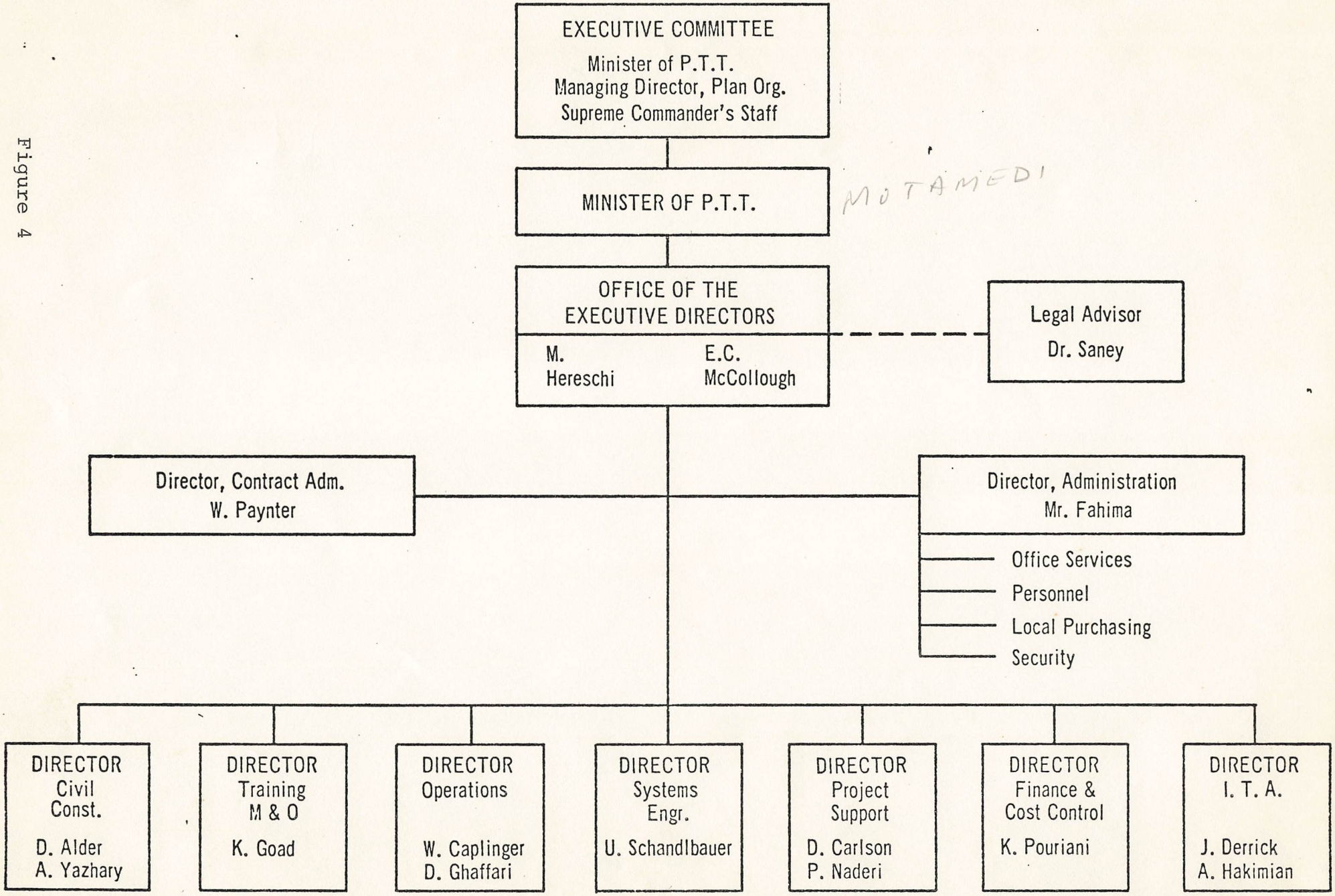
*MR. HERISCHI HAS A DUEL RESPONSIBILITY

Figure 3


TELECOMMUNICATIONS COMPANY OF IRAN
MR. MALEK ABHARI
CHAIRMAN OF BOARD AND MANAGING DIRECTOR
MEMBER OF BOARD
MR. H. HAMIDZADEH
MEMBER OF BOARD
MR. H. HAMIDEH
2M56 PROJECT
PROJECT DIRECTORS
D. E. L. ILIFFE
G. R. A. TOURZAN
MEMBER OF BOARD
MR. SAHBA
SYSTEMS ENGINEERING
MR. M. VOJDENI
MR. T. LARSON
FINANCE
COOPERS & LYBRAND
INSTALLATION TEST ACCEPTANCE
MR. M. AFJEI
MR. LOREN
SWITCHING
SOFRECOM
CABLE
SWEDTEL
POWER
SOFRECOM
CABLE & WIRELESS
BELL CANADA
BUILDING
CABLE & WIRELESS
IRANIAN FIRM

PLANNING AND MANA[illegible]MENT ORGANIZATION

Figure 4



INTS-PMO

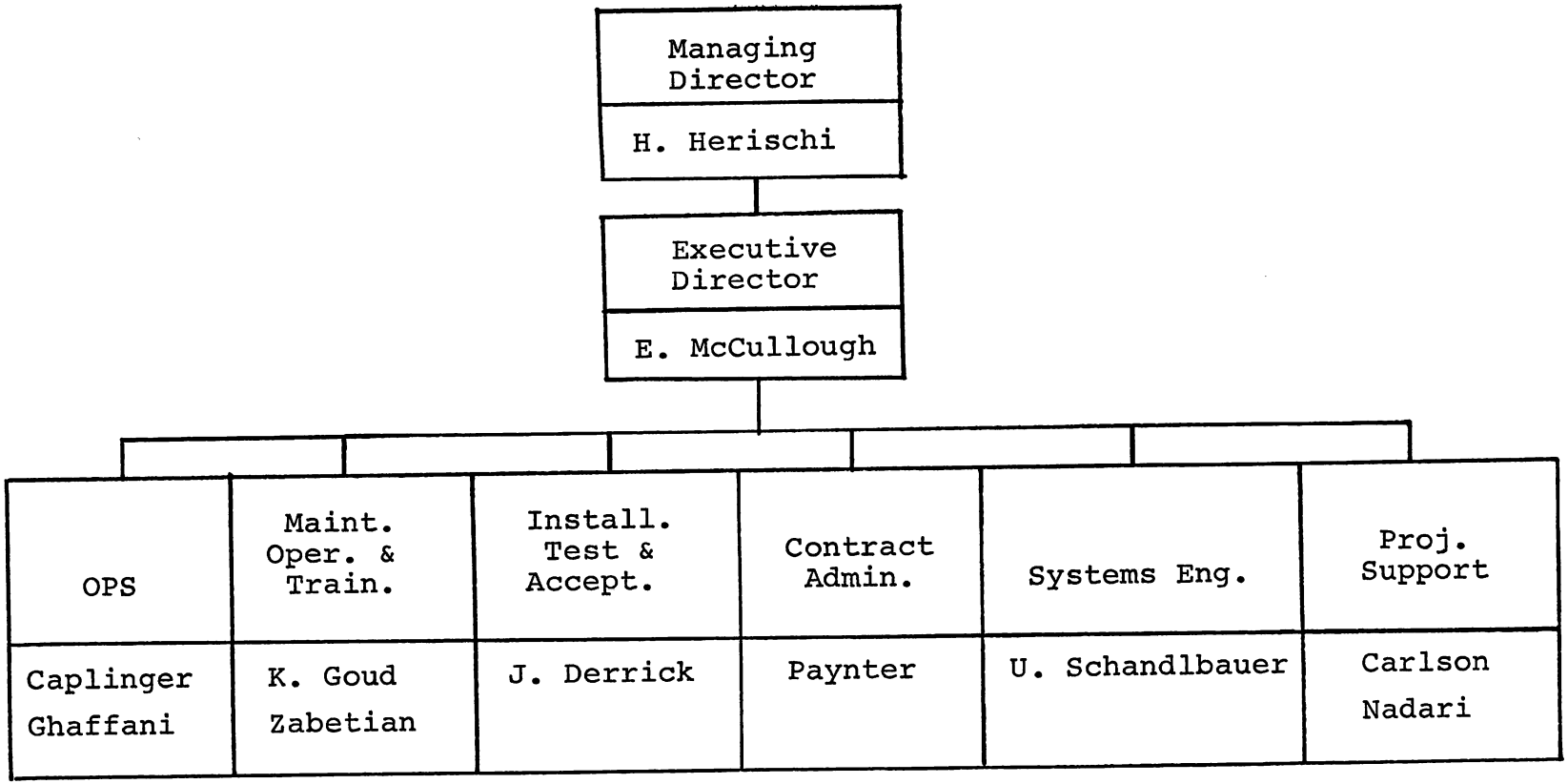

Managing Director
H. Herischi
Executive Director
E. McCullough
OPS
Caplinger
Ghaffani
Maint. Oper. & Train.
K. Goud
Zabetian
Install. Test & Accept.
J. Derrick
Contract Admin.
Paynter
Systems Eng.
U. Schandlbauer
Proj. Support
Carlson
Nadari

Figure 5

H . M. RICKMAN

IRAN

TRIP REPORT

FEBRUARY 22, 1975

TO

MARCH 2, 1975

INTRODUCTION

This report has been written to provide a summary of significant discussions between representatives of the AT&T Company, the Ministry of Posts, Telegraph and Telephone, the Telecommunications Company of Iran and others during the recent visit of the AT&T team to Tehran to discuss a possible role the AT&T Company might play in the development of the Iranian Telecommunications Network. The AT&T team representatives are summarized on Attachment 1. The general structure of the organization of the Ministry of Posts, Telegraph and Telephone and the Telecommunications Company of Iran is reflected on Attachment 2. A view of the Planning and Management Organization (PMO), a part of the Ministry of PTT, is reflected on Attachment 3, and a view of the 2M56 organization, a part of TCI, is reflected on Attachment 4. It should be emphasized that these organization charts were developed on the basis of various discussions with representatives of PTT and TCI and, therefore, represent only our view of the division of responsibility between the various organizations. A summary of key people involved or referred to in these discussions is reflected on Attachment 5.

The discussions started on February 22 and continued through March 1, 1975.

A message was received form Mr. Malek Abhari, Chairman of the Board and Managing Director of the Telecommunications Company of Iran, on January 29, 1975 suggesting further discussions in Tehran relative to the proposed AT&T Systems Architecture-Systems Engineering Study for a Telecommunications Network in Iran. The message further suggested that such talks should be held within 2-3 weeks and would involve a fair sized multidisciplinary team on the part of AT&T as well as TCI.

A telephone call was received from Mr. Motamedi, the Minister of PTT, on February 5, 1975, at which time the Minister inquired if he could be advised if AT&T has reached a decision relative to the proposal made by TCI for further discussions between AT&T and TCI in Tehran and, after emphasizing the great importance he attached to such discussions, the Minister further asked that a person with experience in the area of domestic satellites be included on any team that might be sent to Tehran. The Minister explained that he felt it was essential that such discussions proceed at the earliest possible date because his Ministry is in great need of the type of assistance and guidance that AT&T can provide. Minister Motamedi was advised that AT&T is giving serious consideration to the proposal outlined in Mr. Malek Abhari's message of January 29, and it was further indicated that Mr. Baird, Vice President of AT&T, would head up any Bell System team to participate in further discussions of possible Bell System assistance to the Telecommunications Company of Iran. Upon being advised that Mr. Baird would no doubt reply to Mr. Abhari's message within the next day or so, Minister Motamedi asked if he could be advised as soon as a decision has been reached via telephone, and he further stated that he would be pleased to contact Ambassador Helms if it would aid in expediting a decision on the part of AT&T. It was indicated to the Minister that such action would not be necessary because AT&T is in continous contact with the involved government departments relative to this matter. It was indicated that Mr. Baird would probably propose a meeting date of February 24 in Tehran if AT&T decided to proceed with the discussions as suggested by Mr. Malek Abhari. Minister Motamedi expressed satisfaction with the possibility that Mr. Baird would bring a team to this country for further discussions in this very important area, and the Minister referred again to his earlier statement relative to the need to start these discussions at the earliest possible date. He asked if perhaps Mr. Baird could plan to come to Tehran starting February 17 or, failing this, perhaps he suggested Mr. Baird could come to Tehran two or three days prior to any scheduled meeting so that a number of areas could be explored between AT&T and the Ministry in preparation for discussions between AT&T and TCI. The Minister was assured that his views would be given to Mr. Baird immediately, and the Minister was also assured that Mr. Baird would no doubt comply with his request to be notified via telephone as soon as a message is released to Mr. Malek Abhari.

At the direction of Mr. Baird a telephone call was placed to Minister Motamedi on February 6, 1975 at which time the Minister was informed that Mr. Baird had sent a message to Mr. Malek Abhari informing him that a Bell System Team is being formed to participate in further discussions of possible assistance to the Telecommunications Company of Iran and a meeting date of February 24 or as soon thereafter as mutually agreed was proposed. The Minister was also informed

that Mr. Baird was pleased to accept his invitation to come to Tehran prior to the start of the discussions with TCI on February 24 so that he might explore any aspect of the planned discussions with the Minister personally. The Minister was further informed that Mr. Baird would be accompanied by Messrs. Bright and Rickman and would plan to arrive in Tehran in sufficient time to meet with the Minister by February 22. It was also indicated that four other Bell System representatives would come to Tehran to assist in the discussions with TCI starting on February 24.

It was indicated to the Minister that all of the travel plans were subject to the availability of hotel accommodations, and it was noted that a preliminary check of several hotels in Tehran revealed that there were no rooms available at that time or in the next several weeks. The Minister indicated tha he would request his staff to obtain the necessary hotel accommodations, and he advised that he would request Dr. Alavi, a representative of TCI, to call me relative to this matter. In a later telephone conversation with Dr. Alavi, the names of the team representatives were provided and information was subsequently received on February 16 that hotel accommodations had been arranged at the Tehran Hilton.

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On arriving in Tehran, an attempt was made to meet with Mr. Motamedi and Mr. Malek Abhari on Thursday, February 20, 1975. On arriving at the Minister's office at 9:30A.M., I was not able to see the Minister, as he was attending an official function. I did meet with Mr. Zahir, Vice Minister, from approxmately 10:35A.M. to 11:50A.M.. Mr. Zahir was aware of the planned discussions between Mr. Baird's team and the Ministry and TCI. Mr. Zahir was very interested in the organization of AT&T and how the Bell System is integrated. I explained the organization and outlined the structure of AT&T, pointing out that Mr. Baird, the head of the team coming to Tehran for discussions with the Ministry and TCI is Vice President of AT&T responsible for Engineering and Network Services. Mr. Zahir asked many questions relating to the relationship between AT&T, Western Electric, Bell Laboratories, the Associated Companies and the Independent Companies. While he did not indicate that he planned to participate in the planned discussions between AT&T and the Ministry, he did indicate that he would like to have further discussions at a convenient time. He did not indicate what the subject of such discussions might be.

Upon leaving Vice Minister Zahir's office, I went to Mr. Malek Abhari's office where I learned that Mr. Malek Abhari had left for home at 12 noon, which I later learned, as a matter of interest, is customary for the staff of TCI as well as the Ministry on Thursdays, as this is the day before their Sabbath.

On February 22 I called Minister Montamedi in an effort to set up a meeting between the Minister and Mr. Baird. Mr. Montamedi suggested that he would like to speak with me, and I therefore went to the Minister's office and met with him from 11:05AM to 12:35PM.

Without revealing why he had requested Mr. Baird to come to Tehran for discussions with him prior to the scheduled discussions with Mr. Malek Abhari on February 24, Mr. Motamedi made a number of observations as summarized below:

- It was indicated that there had been considerable discussions within the National government relative to the approach that Iran would follow in developing its telecommunications system. Mr. Motamedi stated that he was pleased that he had been able to convince his government to use the services of AT&T.

- It was indicated that Mr. Asfia, a Minister of State responsible for the overall direction of all programs for all the Ministries had been very deeply involved in the selection of AT&T to develop the master plan.

- It was indicated that the Prime Minister has also personally approval Mr. Sotoodeh as being qualified to provide a consultant service to AT&T where local expertise is required. It was emphasized that the Prime Minister has complete confidence in Mr. Sotoodeh's honesty, ability, etc.

- It was emphasized that Iran needs a thorough plan for a long period of time and as quickly as possible. It was noted that such a plan would include:

  . Telephone, telegraph, data, TV, and military requirements.

- It was suggested that specific projects may also be implemented by the military. Referring to the development of data services, the Minister noted that he is aware of the fact that AT&T had recently declined to bid on a specific data service and, he added that he thought AT&T should participate in future requests for bids in the area of data services even though it is recognized that data is being developed on a piecemeal basis.

- It was emphasized that Iran has selected the GTE switching system. Noting that the GTE system is almost the same as the Bell System ESS, the Minister also noted that GTE and the Ministry of PTT will produce some of this equipment in a factory to be built in Shiraz.

- Reference was made to the fact that a number of projects are underway in the area of cable system development and network development. Specific reference was made to the fact that NTC is developing the

international network. The point was made that there is a critical and immediate need to consolidate the many projects underway. It was indicated that consulting engineers have already been selected in several areas and specific reference was made to:

- French PTT, whom it was suggested would design the network,
- Swed Tel, would be responsible for designing the local network, and
- NTC would be responsible for designing the Tehran local network.

- It was stated that the microwave system would be completed soon (within next 2 months), but this will not be enough. Seimens has a contact to enlarge the exchanges.

- It was indicated that the telex exchanges are completely computerized. It was also indicated that RCA Globcom has been selected in this area, and reference was made to the fact that there will be two networks - Latin and Farsi.

- In discussing domestic satellites, it was indicated that there is a huge demand for educational and entertainment TV and telephone requirements. Consequently, it was stated that there is an immediate need for domestic satellites to interface with existing terrestrial systems. Reference was made to the fact that many countries had already proposed a satellite system for PTT, including several companies from the U.S. The Minister indicated that he had recommended that AT&T be asked to develop the satellite system. It was indicated that it would be necessary to take military requirements into consideration, and these requirements might account for half of a satellite system, or they might require a separate system. In any event, it was indicated that the following requirements would be provided by the satellite system:

  - PTT and TCI
  - Military
  - TV, program
  - Other

- The Minister referred to the "program of negotiations." In this connection, he suggested that it would be helpful if Mr. Baird would contact Mr. Sotoodeh and discuss the approach that should be followed. Mr. Sotoodeh, the Minister pointed out, is the retired Minister of PTT and is currently the Chairman of the Board of the Iran Technologies Corporation. Minister Motamedi pointed out that it will be necessary for AT&T to have an in country consultant or associate in the event AT&T should undertake the project proposed

by the Ministry of PTT and TCI, and the Minister referred to Mr. Sotoodeh's ten years of experience as Minister of PTT, his thorough knowledge of the communications requirements of Iran, his unique standing with representatives of the Iranian National Government and particularly with Mr. Hoveyda, the Prime Minister. Concluding, Minister Motamdei repeated his earlier statement that the Prime Minister had given his personal approval to Mr. Sotoodeh to act in the capacity of consultant to AT&T in the event AT&T agrees to undertake the project under discussion. The Minister emphasized that AT&T could no doubt find other people in Iran who could act as an in-country consultant, and he emphasized further that AT&T is unquestionably free to choose whomever it wishes to act as its consultant, but he expressed doubt that anyone could be found who could do the job as successfully as Mr. Sotoodeh.

- Continuing, the Minister stated that there should be two contracts between AT&T and Iran, namely;

  - The development of the master plan, including a satellite plan and frequency management should be done by AT&T for PTT.

  - Some items will be given to TCI and, therefore, a contract between AT&T and TCI will be required. It was noted that there is a need for discussion between the two parties to determine what the contract should cover.

- At this point the Minister emphasized that everyone is anxious for AT&T to sign the contract. In this manner he suggested that it would be possible for other Bell System Companies, and specifically Western Electric, to bid on equipment. It was also suggested that Iran would have no difficulty in going to "sole source" where there are unique circumstances, but the Minister added that there is great interest in his government in maintaining an impartial approach. The sole objective of his government, he pointed out, is to get the best possible and most suitable telecommunications system. It was added that it is recognized that such an approach will cost a considerable amount of money.

- Concluding, the Minister stated that he welcomed the AT&T team to Tehran and he would look forward to talking directly with Mr. Baird.

It was suggested to the Minister that Mr. Baird was looking forward to talking to him at his earliest convenience, and he was also looking forward to meeting with Mr. Malek Abhari. The Minister was also assured that his thoughts would be conveyed to Mr. Baird immediately. Referring to the suggestion by the Minister that Mr. Baird contact Mr. Sotoodeh to discuss the approach that should be followed in negotiating the contract, it was suggested that it might expedite all of the discussions between AT&T and the Minister, and between AT&T and TCI, if Mr. Baird could meet with the Minister prior to any discussions with Mr. Sotoodeh and prior to the planned discussions with Mr. Malek Abhari on February 24.

The Minister indicated that he would be pleased to meet with Mr. Baird if he should perfer this approach. He indicated that he would like for Mr. Malek Abhari to be present at the meeting, whereupon he called Mr. Malek Abhari to inquire when he might be available for such a meeting. On the advice of Mr. Malek Abhari, Mr. Motamedi suggested that they would be pleased to meet with Mr. Baird in the Minister's office at 4:00PM on February 23. Referring to the earlier suggestions that it might prove helpful if Mr. Baird meet with Mr. Sotoodeh prior to the scheduled meeting with the Minister and Mr. Malek Abhari, Mr. Motamedi suggested that he wanted Mr. Baird to understand clearly that any decision he made in this matter would be entirely satisfactory. The Minister emphasized that he recognized that AT&T should be free to select whomever it desired as an Iranian associate. He referred again to the fact that the Prime Minister had already approved Mr. Sotoodeh for such a role, and he implied that whomever AT&T decided to use as an Iranian associate he would have to be approved by the Prime Minister. The meeting terminated at 12:35P.M.

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On the recommendation of Mr. Motamedi, Mr. Baird met with Mr. Sotoodeh for lunch on February 23. Also present at the meeting were Messrs. Bright and Rickman. Mr. Sotoodeh expressed his enthusiastic support of the planned discussions between AT&T and the Ministry of PTT relative to possible Bell System assistance in the development of the Iranian Telecommunications Network. Mr. Sotoodeh further indicated that he had long supported such a role for the Bell System, and he noted that he had recommended to Minister Motamedi, and to the Prime Minister, that the Bell System be selected as the consultant for the important task of developing the Iranian Telecommunications Network. Mr. Sotoodeh stated quite frankly that the Bell System would be totally reliable and honest in dealing with the Minister of PTT in such a major undertaking, and he suggested that his country must have the assistance of the best consultant available in this important undertaking. He stated that as the most powerful organization in the world, AT&T would be very successful in this role. Mr. Sotoodeh again indicated that he was pleased that his recommendations had been accepted by the Prime Minister, and he also referred to the fact that Mr. Asfia (apparently an assistant to the Prime Minister, but it was later clarified that Mr. Asfia is in fact Minister of State without Portfolio, according to the U.S. Embassy) was in complete accord with the decision to ask AT&T to undertake the task under discussion. In this connection Mr. Sotoodeh indicated that the scope of work is much larger than originally contemplated in the initial discussion between PTT and AT&T.

As a result of a series of direct questions posed with Mr. Sotoodeh, the following additional main points evolved:

- Mr. Sotoodeh feels that AT&T should have two contracts for the proposed undertaking, namely, one with the Ministry of PTT and one with TCI.

- In Mr. Sotoodeh's view the proposed contract with PTT would involve the master plan, and the proposed contract with TCI would involve consolidation of a large number of specific projects. In other words, he viewed the effort for TCI as being one of project management.

- Mr. Sotoodeh clearly feels that there is an urgent need for Iran to have a long-range plan, and there is also an urgent need to give direction to projects underway so that they will interface with the master plan in the most efficient manner.

- Mr. Sotoodeh feels that AT&T has already been selected as the consultant for this most important undertaking, and he now feels that it is a matter for AT&T to determine what the assistance will be and to negotiate the contract.

- Mr. Sotoodeh expressed a firm opinion that neither PTT or TCI are capable of knowing what should be done and therefore must rely upon AT&T to tell them.

- Mr. Sotoodeh indicated that it would not be productive to talk about the services that his organization might provide to AT&T as the in-country consultant until AT&T has a contract with PTT and TCI.

- Mr. Sotoodeh clearly agrees that any payment by AT&T for his services in the capacity of an in-country consultant would be based on a contract, and he further agreed that he does not expect any compensation until a contract has been agreed upon.

Mr. Sotoodeh was very helpful and cooperative in every respect, and he emphasized on several occasions that it is his sole objective to assist his country in developing the best communications system possible. He expressed his appreciation for the opportunity to discuss this important matter, and he indicated that he would be pleased to provide whatever assistance he could at this phase of the discussions. He indicated that he felt that the next logical step is for AT&T representatives to discuss the entire matter with PTT and TCI in as much detail as may be needed.

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A meeting was held in the office of the Minister of PTT on February 23, 1975. Those in attendance were as follows:

Mr. K. Motamedi - Minister of PTT

Mr. Malek Abhari - Chairman of the Board, Telecommunications Company of Iran (TCI)

Mr. J. A. Baird - Vice President, AT&T

Mr. R. Bright - General Manager, Western Electric

Mr. H. Rickman - Staff Manager, Long Lines

The Minister welcomed Mr. Baird and his team to Tehran. He immediately referred to the fact that AT&T would be requested to assume responsibilities as a major consultant for the express purpose of:

- developing a master plan, and

- assuming responsibility for specific projects; some on going and others not yet started.

Specific reference was made to project 2M56, and it was emphasized that this project relates to telephone service. It was further emphasized that there are other important projects, and transmission and switching were named as examples. It was noted that telephone equipment is provided by TCI, but teletype equipment is not. It was also noted that TCI can provide some data equipment, but in most cases it was suggested that the customer would have to provide.

Mr. Malek Abhari referred to his message of January 29, 1975, in which he attempted to outline the role AT&T would be expected to play in the development of his country's telecommunications system. He suggested that as soon as the team representatives have an opportunity to review the projects currently underway it would become more clear what is meant by a master plan. For example, it was indicated that it is anticipated that the demand for data services will be quite heavy in the next few years, and reference was made to the fact that there will be an ever increasing labor shortage. Continuing, it was indicated that TCI is thinking of a dedicated data network or data superimposed or both. It was explained that 50 kilobits would suffice for the next 4 or 5 years, but it would be necessary to consider 2 megabits in the next few years. The point evolved that such requirements will exhaust the existing and planned microwave routes quite early, and it will, therefore, be essential to consider other alternatives and the use of the waveguide was suggested as a possibility. Further, it was related that the 2M56 program would involve several thousand locations which are unknown at this time. In any event, it was suggested that it is essential that an engineering study be completed in the near future to design an optimum network. Because the network will ultimately involve 2 to 3,000 locations, it was suggested that domestic satellites could play a very important role. It was emphasized that a majority of the locations have not yet been identified.

The Minister then summarized by saying that we will be concerning ourselves with two tasks, namely;

- immediate requirements, and

- requirements in the next 10 to 15 years.

It was emphasized that the first order of business will be to gather data and develop a plan as soon as possible. It was indicated that there are many indicators available for this purpose and reference was made to the fact that such data would, of necessity, include per capita income, per capita power consumption and others. While it was indicated that such data could be obtained from the various Ministries, it was suggested that the data should not be relied upon for the development of the master plan.

Referring to the fact that the master plan should include all telecommunication requirements, it was indicated that the Ministry has thought they were doing long range planning in the past but had always been wrong. It was emphasized that it is for this reason that the assistance of AT&T is required. By way of further explanation it was indicated that in the opinion of the Ministry, AT&T has proved they know how to plan. Because the Ministry has the responsibility to insure that all requirements have been considered, including telephone, telegraph, LD, local, cable, microwave, satellite and other, it was suggested that the Ministry is anxious to have the assistance of an organization that has proven it can do the job.

Other facts were offered as justification for immediate action, namely

- In 5 to 7 years after the Iranian National Telecommunications System (INTS) is completed, there will be a shortage of channels and with only 500,000 telephones in service at this time.

- It was related that there are now 8,000 channels in service in INTS, and one half of the 8,000 channels are assigned for military use.

- It was further related that an additional 24,000 channels are scheduled to be turned up for service in September or October 1975.

The Minister again referred to the fact that they had always been wrong in their planning. He noted that many consultants had been used in the past, and they too had been wrong. He expressed the hope that this will not be the case with AT&T. In summary, it was suggested that in the same manner that the road system serves the entire population so should the telecommunications system.

Mr. Baird suggested at this point that it was his objective to learn enough about all of the projects under discussion to permit the AT&T team to return home and propose a scope of work statement.

The Minister agreed that it would be necessary for the AT&T team to study the problem in detail. It was recognized also that time will be required to collect data. But it was emphasized that Iran's problems are not unlike other underdeveloped countries in that there is not much data available relative to past experiences and, in any event, such data should not be the basis for developing a master plan. It was also noted again that although there are a number of plans being implemented, AT&T should not base its work statement on these plans. In short, it was recognized that a number of projects underway are undoubtedly wrong, but they must go forward. Specifically, it was indicated that it would be necessary for AT&T to comment on what is wrong and what is right relative to the short term plans, but it might not be possible to correct them at this late date. As an example, it was suggested that the 2M56 program might not match the present LD plan. If such is the case, the objective should be to correct those things that have to be corrected.

Mr. Malek Abhari referred again to the terms of reference outlined in his message of January 29, and suggested the following procedure:

- AT&T must first get acquainted with existing projects, and

- As AT&T becomes acquainted with the projects in detail, comments could be provided to TCI.

In reply to a question about the need for time to permit the AT&T representatives to study the data relative to the projects under discussion, Mr. Malek Abhari cautioned that it may never be possible to find the answer in some areas. For example, it was suggested that AT&T may never be able to determine what the community of interest is between two points and, in any case, it will require that the decision be based on assumptions. Therefore, it was suggested that a good starting point would be to look at the assumptions already made by TCI. It was recognized that different teams would be looking at all of these areas simultaneously.

Continuing, Mr. Motamedi suggested that it would be necessary to study two kinds of information, namely

- available information in all of the Ministries relative to past experience and plans for the future. Again, it was emphasized that a master plan should not necessarily be based on this kind of information, and

- military requirements would have to be obtained directly from the military authorities. In this connection, it was emphasized that it is essential that a frequency management program be adopted in the near future because of the diverse use of the frequency spectrum and especially because the military uses a large share of the frequencies. In this connection, it was indicated that frequency mangement will continue to be the responsibility of PTT. In summary, it was indicated that the frequencies would be used by the following organizations:

  . TCI

  . Military

  . Private

It was noted that the current INTS project involves 550 sites, and over 150 are military--for a total of 4,000 channels now and 6,000 planned in the near future. Other uses of frequency spectrum were named as Civil Aviation and Ministry of Health.

In discussing the need for in-country assistance in gathering data, it was suggested that Mr. Sotoodeh could provide assistance in this area which would, no doubt, save a great deal of time. In exploring the possible contractual arrangements between AT&T and Mr. Sotoodeh, Mr. Motamedi suggested that the arrangements would have to be worked out between the parties. The Minister added that it is the policy of his government to require that an Iranian organization work along with an outside consultant in order to learn the business and hopefully assume the responsibility sometime in the future.

In answer to a question relative to the number of AT&T people that might be located in Iran, Mr. Motamedi stated that AT&T must answer that question. It was further suggested that the question really relates to the problem AT&T might experience in settling people in Iran. Mr. Motamedi suggested that he recognized that different kinds of people will be required, but he reemphasized that AT&T must answer the question relative to the proper number of people.

Mr. Bright suggested that the subjects discussed thus far suggests two definite approaches, namely;

- on-going projects, and
- master plan.

It was further suggested that on the basis of the on going projects one master plan might be indicated while, upon a detailed analysis of total requirements, some other master plan might be indicated.

Mr. Motamedi recognized that a master plan cannot be developed to do everything. And he recognized that there now exists in TCI an urgent need for "A" system for maintenance and operation. The same need exists for local service. But it was emphasized that these needs have nothing to do with a master plan but will, no doubt, have some effect on the master plan.

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The initial meeting of the multidisciplinary teams of AT&T and TCI commenced in the board room of TCI headquarters at 9:A.M. on February 24, 1975. Those in attendance were as follows:

TCI

Mr. Malek Abhari - Chairman of Board and Managing Director

Mr. D. E. L. Iliffe - Program Director, 2M56 Development Program

TCI (Cont'd.)

Mr. T. Larson - Deputy Director General of PTT, Sweden on temporary duty with TCI as Co-Director, Systems Engineering

Mr. M. Vojdeni - Director, Systems Engineering

AT&T

Mr. J. A. Baird - Vice President, AT&T

Mr. R. Bright - General Manager, Western Electric

Mr. R. D. Dalziel - Director, Engineering and Network Services, AT&T

Mr. J. A. McCarthy - Director, Network Objectives and Private Network Planning, Bell Labs

Mr. G. Spiro - Director, Local Switching Engineering Center, Bell Labs

Mr. R. C. Harris - Engineering Manager, Long Lines

Mr. H. M. Rickman - Staff Manager, Long Lines

Mr. Malek Abhari opened the meeting by reviewing in a general way the organization of TCI. In this connection, he noted that TCI consists of 15,000 employees, and he noted that another 7 - 8,000 employees will be added in the near future. It was also noted that the 2M56 program has the objective of providing 2 million telephones by the end of the Iranian year 1356. It was emphasized at this point that equipment is not the problem with this program. Rather, it was pointed out, the problem is people. Specifically, reference was made to the following broad problem areas:

- lack of people to do the job.
- lack of motivation to do the job, and
- lack of standards.

Continuing, Mr. Malek Abhari indicated that all of the files of the 2M56 program would be made available to the AT&T team. Reference was made to the fact the 2M56 building is south of the Intercontinental Hotel and occupies 8 floors, enough space for 4 or 500 people, 60 percent of whom are now available.

Mr. Malek Abhari stated that the 2M56 program is serving as a training ground for Iranians. He noted also that the 2M56 program uses a number of consultants, and specific mention was made of the fact that Cooper and

Lybrand serve as the Financial Consultant and Cable and Wireless serves as the Building Consultant. Referring to the transmission side of the 2M56 program, it was noted that this group is now only a nucleus of a liasion group and is staffed entirely by Iranian engineers. In the Systems Engineering Group it was noted that there are currently 28 Iranians and 39 expatriates.

At this point Mr. Malek Abhari made reference to the fact that there have been a number of offers to build a domestic satellite. He continued by saying that there are three phases to be considered in the development of his country's telecommunications network; namely, past, present and future. Referring to the future, it was stated that the manpower, management and organization functions will be handled by a consultant who will be selected soon. Referring to the present, it was indicated that the immediate objective is to

- provide telephone exchanges for 1000 locations,
- design a required transmission network, and
- tender contracts.

Reference was made to the fact that the French are developing the traffic matrix, and it was indicated that there is a need to establish a group to review the projections of the French consultant and develop a national multiplex plan. In this connection it was indicated that a multiplex plan exists for only a small number of towns - approximately 60.

Reference was made to the urgent need for line management practices. More specifically, it was indicated that there is a need to establish records to indicate where equipment is for start of new services, cable pair assignment, equipment assignment, etc. It was explained that TCI provides the wires to the outside of the subscribers house and provides the subscriber with a phone. The inside wiring and connection of the phone is the responsibility of the subscriber. Party lines are not available, but it is known that many subscribers extend their lines to the residences of neighbors.

Mr. Malek Abhari indicated that under the law TCI is responsible for providing telephone service to the entire nation. He further indicated that the TCI objective is not necessarily to get a return on investment but rather to provide a good telecommunications network, and provide good telephone service. It was suggested that telephone service, like the road system, should be available to everyone, regardless of where they are located.

Mr. Iliffe suggested that perhaps it might be of interest for the AT&T team to understand how the 2M56 program came into being. In this connection, it was stated that the Prime Minister, Mr. Hoveyda, made a recent visit to Spain. While there he made a number of inquires relating to the number of telephones in the country and the population. Upon learning that Spain, with a population of 32 million had approximately 6 million telephones, Mr. Hoveyda decided that Iran should have 2 million telephones by the end of Iranian year 1356. From this initial objective, the project has been expanded to provide for 8 million telephones by the end of Iranian year 1366.

Relating this background information to a more specific objective, it was suggested that there are three main areas that need to be investigated, namely;

- traffic network design, including cables and buildings,
- documentation on training, logistics, maintenance and operation; and
- international service.

It was indicated that the contract for maintenance and operation has been held up pending formal arrangements with AT&T. The need for better people was emphasized, but it was stated that this could only be accomplished by improving the wage and salary policy. It was further stated that wage and salary treatment is under strict government control. In any event it was indicated that there are a number of activities underway to establish an organization in line with the stated objectives. It was stated that the new organization will be a modular one, that is, the country will be divided into four or five divisions and the division managers will be given authority to make day to day decisions. In addition, there will be a number of service divisions and measurements plans will be introduced. It is interesting to note that when a copy of the present organization chart was requested, Mr. Malek Abhari indicated that it would be of no use since the organization is currently undergoing drastic changes. Similar replies were also received when similar requests were made in the past. Referring to the timetable for the proposed organization changes, it was noted that

- the plan has been established,
- wage and salary studies are underway, and
- within the next 12 months the new organization should be a reality.

In explaining the current relationship between TCI and the various consultants, it was emphasized that while TCI currently relates to each consultant on the basis of its functional responsibility, it would be expected that AT&T would review the activities of each consultant and make comments and recommendations directly to TCI. Several examples were discussed which related to the manner in which AT&T would be expected to review and comment to TCI. Examples related to the French PTT, Swedtel, NTC, and others including Hughes Aircraft, COMSAT, Fairchild, etc. At this point in the discussion, Mr. Iliffe of the 2M56 program suggested that AT&T would, of course, be expected to review and comment on the 2M56 program. He further stated that he knew that some mistakes had been made, and he welcomed comment, recommendations, and criticism by the AT&T group. However, he requested that whatever comments the AT&T team might wish to make, should be provided to the 2M56 Project Director, and he emphasized that they would reserve the right to differ and, in fact, disagree with such comments and/or criticism. Mr. Malek Abhari injected that any comments or criticisms that might be made by AT&T to TCI would, in fact, be to 2M56 also; because he pointed out that 2M56 and TCI are one and the same.

Returning to the subject of how AT&T would relate to the various consultants under contract to TCI, Mr. Malek Abhari made the point that TCI does not plan to act on the numerous satellite proposals until AT&T has had the opportunity to study the entire problem and determine where domestic satellites should fit into the overall picture. Only at that time will TCI enter into detailed discussions with the appropriate satellite people. Reference was also made to the requirements of the military, and specific mention was made of the following military configurations without explaining what they involved

- PEACE SEPTOR
- PEACE SWITCH
- PEACE RUBY

In addition, it was noted that by the end of the current 5-year plan, over 300 of the 1000 planned locations would have a population in excess of 5000 inhabitants. — 1000 stations.

At this point Mr. Larson, currently the Deputy Director General of Sweden PTT, and on temporary assignment to the 2M56 program, suggested that it might be helpful for the AT&T team to have another view of the 2M56 program. He emphasized that he had only been in Iran a few days, and his basic understanding of the 2M56 program is based primarily on an enormous amount of reading material. He then offered a summary of the roles played by the various consultants in the implementation of the 2M56 program. Specifically, he outlined the following responsibilities:

- French PTT designed network, numbering plan, estimated level of traffic, and forecasted number of circuits.
- Swedtel designed local networks and is expected to make proposals for exchanges, outside plant, engineering design. In this connection, it was emphasized that Swedtel must consider the next 20 years in its planning but must, as a matter of necessity, design a network for 2 million telephones.
- NTC is responsible for the Tehran network.
- Buildings will be handled by special consultants, and it was noted that they have started too late.

Mr. Larson opined that TCI has the responsibility for coordinating the activities of all of the above consultants, and he offered the further observation that the LD Network is an urgent problem. It was further stated that service controls are in effect in some areas but probably not on the right things. It was stated that 30 percent of the outside plant is not working, and none of the normal Bell System indices are in effect. Concluding, it was indicated that TCI does its own construction work and will continue to do so on an expanded basis, but it was emphasized that these efforts will not be sufficient to handle the 2M56 program.

At this time there was some general discussion relative to telephone rates at which time the following evolved:

- a telephone subscriber pays a deposit of 20,000 Rials and the deposit is refundable upon cancellation of the service. It was noted that there are very few cancellations because the telephone number is usually sold at a much higher price. (66 Rials = $1 US).

- in addition, a telephone subscriber pays a monthly payment of 300 Rials, and

- LD calls are pulse metered.

- pay station calls are at the rate of 2 Rials per call.

The meeting with Mr. Malek Abhari terminated at approximately 10:50AM and the AT&T team reassembled in the office of Dr. Tourzan, an Iranian and a Co-Project Director of the 2M56 program. In addition to the AT&T team members and Dr. Tourzan, the following additional representatives of the 2M56 program joined the discussion:

Mr. Mohsen Afjei - Director of Installation, Testing and Acceptance (ITA) Department

Mr. M. Hedayati - Director of Administration and Personnel

Dr. Tourzan continued the discussions by offering some additional background information, namely

- Project Plowshare was the name of the original project designed to provide telecommunications service to all villages.

- Project Plowshare has been renamed to VILCOM - Village Communications.

Moving quickly to the role he expected AT&T to play in the 2M56 project, Dr. Tourzan suggested the following:

- AT&T should look at all jobs, and make judgments and recommendations.

- in looking at all jobs, AT&T should assume that the transmission plan is out of control.

- AT&T should be aware of the fact that many directors have the opinion that he is going to do the 2M56 program.

In summary, Dr. Tourzan stated that the 2M56 program is in a "mess", and AT&T should study the situation carefully and advise TCI what is wrong and what should be done. Continuing, Dr. Tourzan stated that the 2M56 office would like to do the 2M56 program plus the transmission plan, but

he added that the 2M56 office would no doubt make some mistakes as they are no doubt doing with the 2M56 program. In addition, he advised that the 2M56 office knows very little about the military program, which he added would be essential to any overall transmission plan.

Dr. Tourzan offered the complete assistance and cooperation of his department in the furtherance of the discussions between AT&T and TCI, and the meeting terminated for lunch with the understanding that a visit would be made to various TCI offices following the lunch hour.

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A meeting was held with Mr. M. Herischi, the Managing Director of the Plans and Management Organization (PMO) on February 26, 1975. Representing AT&T were Messrs. Baird, Bright and Rickman.

Reference was made to the fact that the AT&T team, consisting of seven people, was in the process of visiting various offices in TCI and the Ministry of PTT to get a first hand view of the telecommunications projects underway and hopefully gain some insight about the plans for the future. In this connection, it was suggested that certain members of the team were anxious to talk with representatives of PMO as soon as possible. Mr. Herischi indicated that he would be pleased to coorperate with the AT&T team members in any way that he could and he designated Mr. U. Schandlbaur, Director of Systems Engineering, as the main contact in the department. He noted that Mr. Schandlbaur could be contacted on 849004 or 849043. It was also agreed that it would be entirely acceptable for the AT&T team members to visit PMO at their earliest convenience.

The discussion proceeded in a very general fashion. It was developed that the PMO consists of approximately 2200 employees, 180 of whom are expatriates. PMO is housed in four separate buidlings. The department is headed up by a Managing Director, Mr. Herischi, and a Co-Director, Mr. E. C. McCollough, the President of the McCollough and Company, Inc. with headquarters in Washington, D.C. There are four main contractors currently under contract to the PMO. GTE, NEC and Seimens are providing multiplex equipment and Page is responsible for installation and acceptance of the equipment. Engineering is done by PMO. It was indicated that Philco Ford is under contract to the Iranian Air Force.

While PMO has planned and built the existing telephone network, it has not done any long range planning. PMO is currently engaged in planning the Village Communications Program (VILCOM), which has the objective of providing communications to locations with 2-3000 population. In planning the Iranian National Telecommunications System (INTS), it was the original objective to provide communications to cities with 40,000 population. It is estimated that this project will ultimately involve 5-6000 locations which will be served as extensions off of the current microwave system (INTS).

In this context it was emphasized that the 2M56 program involves only switching. While the 2M56 program will involve locations with telephones, it has no means of transmission. It was pointed out that the PMO is currently responsible for operating and maintaining 320 INTS locations. It was indicated that PMO is currently planning to add 2400 channels on the existing microwave system. Channel requirements are increasing rapidly for both message telephone and leased services. Some military requirements are also provided on INTS to over 250 sites and are served via cable extensions in many cases. In addition, it was pointed out that TCI and NIRT provide channel and TV requirements. It was noted that NIRT is currently using two tethered balloons in the southern part of the country to provide TV service to remote locations.

Referring to the lack of long range planning by PMO, Mr. Herischi emphasized that his department had been providing inputs to the Minister of PTT showing that something should be done. It was emphasized again that both TCI and PMO are trying to implement projects and are not doing future and long range planning. It was further emphasized that TCI and PMO jointly have no experience in operating any telephone system in excess of 500,000 telephones. Reference was made to the fact that only recently eight months was required to provide a leased channel to a customer. Mr. Herischi further noted that the management of PMO has been reduced significantly over the past several months due to the necessity to provide experienced people for the 2M56 program.

Relating the current problems of TCI and PMO to any effort that might be undertaken by AT&T, it was Mr. Herischi's view that in developing a long range plan, AT&T would have to get channel requirements from TCI and PMO would provide information and assistance in matters relating to transmission. In handing short range planning it was Mr. Herischi's opinion that AT&T would have to decide how best to work with TCI and PMO and tell them what to do. In this connection, Mr. Herischi asked if AT&T would provide guidance in the maintenance and operation of the system as a part of the long range plan, and he further inquired if frequency management will be included in the long range task. It was indicated that frequency management is clearly within the long range planning task, but it was suggested that it is too early to specify where maintenance and operation assistance would fall. Referring to the subject of frequency management, it was stated that frequency allocation is done by PTT, but it was emphasized that management of frequencies within the country is not being done. It was further stated that frequency monitoring is also a part of frequency management, and it was noted that there are three monitoring stations in the country but are not operational because they have only recently been installed.

In conclusion, Mr. Herischi indicated that he felt his greatest problems in connection with the INTS project are people and management. Mr. Herischi displayed a modest amount of pride in the fact that PMO had provided a number of key management personnel for the 2M56 program.

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At the invitation of Mr. George Reish, Vice President, Hughes Aircraft, a meeting was held on February 26 to review in an informal manner the experience of Hughes in locating people in Iran. Also attending the meeting were Mr. Garvin Shatts, Director of Operations for Hughes and Messrs. Baird, Bright and Rickman of AT&T.

Mr. Reish outlined in very general terms some of the experiences his company has had in the process of doing business in Iran. He noted that he has been stationed in Tehran for almost two years, and Mr. Shatts has been in Tehran approximately six months. Some of the pertinent observations by Mr. Reish are summarized in general as follows:

- It is very difficult for a U.S. company in Iran to be successful without an in country agent (consultant). It was noted that Hughes does not, as a matter of corporate policy, have a consultant, and it was suggested that this could account for the fact that Hughes has lost a large amount of business.

- There are two levels of consultants, possibly more, in Iran and it was noted that approximately five people in the country are involved in the highest level of in country consulting, usually involving contractual matters, and are, as a matter of fact, very wealthy people and very close to the court. These people provide political connections in other words.

- Mr. F. Sotoodeh was named as being an associate of one of the five most important people involved in a consultant's role, and it was also indicated that Mr. Sotoodeh is second man in the party - second to the Prime Minister. Mr. H. Mahiv was named as one of the five high level consultants and an associate of Mr. Sotoodeh. There is also a feeling that Mr. Sotoodeh was forced to relinquish his role as Minister of PTT, but it is the feeling that Mr. Sotoodeh has continued to remain close to the Prime Minister as well as the court. This assumption appears to be based largely on the fact that Mr. Sotoodeh was permitted to assume the Chairmanship of the Iran Advanced Technologies Corporation, a supposedly important organization, although it has not been determined what the corporation does.

- A second level of consultants are involved in the job of getting things done, such as housing, materials, payment of bills, etc. These are the people that all companies apparently use and they are generally thought of as a necessary part of the business world in Iran. In some instances procuring the services of these people require a considerable amount of money. When asked if these people are the same as the so called "Armenian fixers", there was a general expression of unfamiliarity with the expression "Armenian fixers", but it was generally concluded that they are in fact one and the same.

- Most U.S. companies in Iran, and most likely all companies, experience a great deal of difficulty in receiving payment for goods and services. Mr. Reish referred to several examples where Hughes had not received payment for several months, and at least one example was named where Hughes spent more money collecting the bill than the bill was worth. It was noted that bill was for $72,000.

- It was generally felt that slow payment for bills is not due to the fact that the Iranians deny the obligation or refuse to discharge the obligation but merely because a long administrative process is involved and upwards of two dozen people have to sign off on the expense statement. Other problems also contribute to slow payment of bills such as personnel moves, transfer of funds from one department to another, etc.

- It was noted that an engineer with some five years of experience might involve expense of $72,000 as recently as one year ago, and in the order of $100,000 now, to the Iranian government. It appears to be the practice of some companies to arrive at a total amount of money for the services of an engineer which would include loading, housing, food, transportation, taxes, etc. In this connection, it was noted that Americans working in Iran are subject to Iranian taxes and are at this time excused from paying U.S. income taxes on the first $20,000, provided the person remains in the country for at least 18 months.

- Housing appears to be available, although it is very expensive. Hughes seems to prefer shipping some furniture from the U.S. to Iran, and an allowance is provided so that employees can purchase furniture in the country, which appears to be quite adequate. Some other companies apparently ship all furniture to Iran, including 120 volt utility equipment, such as washers, dryers, etc. This requires that the local 220 volt supply be converted to 120 volts which, of course, requires a sizeable transformer in each apartment.

- There was some discussion relative to the various formulas that are used in computing salary differentials, and Hughes appears to pay 20% in Tehran and 30% in Shiraz and up to 60% in remote locations. Living expenses and housing allowances seem to relate to the size of the family. A trip back to the U.S. is allowed every two years, and transportation is provided for children in school at other locations. School allowances are also provided in the case of Hughes, and this appears to be rather standard although the formula for determining the amount varies in each case. It was indicated that these formulas are developed by Hughes headquarters people who visit the country occasionally. There was an expressed feeling that the current method is not entirely satisfactory.

- Executive secretaries are in demand and are paid quite well. Secretaries who are bi-lingual are in great demand and are paid exceptionally well. Lower level secretaries are also in demand and appear to receive salaries in excess of the normal.

- The Hughes driver earns about $250 per month. Taxi drivers earn about $150-200 per month and usually have a second job. Taxi drivers apparently earn more than government workers, who keep their jobs for security and retirement and also have a second job in many instances.

- Mr. Reish expressed little knowledge of the military network in Iran and is not knowledgeable on how the military and civilian agency coorperates. It was the opinion of Mr. Reish that the differing views as to which agency would have overall responsibility for the development of the country's telecommunications network had been settled in favor of the Minister of PTT having overall responsibility, but Mr. Reish was of the opinion that the Iranian Military would probably wish to talk to AT&T. Mr. Reish specifically asked if General Ghatami had been contacted. It was indicated that the AT&T team had come to Tehran at the invitation of TCI and the Minister of PTT, and, therefore, it was not planned to contact any other organization except, of course, the U.S. Embassy. Mr. Reish also noted that General Toufani is head of the Iranian Procurement Department, and he also mentioned Admiral Attai, who heads up the Iranian Navy. He also mentioned that General Jablonsky is still active as the chairman of the consortium consisting of NEC, GTE-Italy, Page and Seimans, but he seemed to imply that it is difficult for the consortium to present a united front.

- It was indicated that Hughes had made a bid on a domestic satellite system for Iran and it was offered to provide AT&T a copy of the bid. Further discussion revealed that Hughes headquarters had already contacted Western Electric about the proposal and had, in fact, asked if Western Electric was interested in providing the earth stations. Western Electric declined the offer since this is outside the expertise of Western Electric.

- Mr. Reish indicated that any U.S. company doing business in Iran is likely to have its good name "tarnished" somewhat, and he indicated that while Hughes came to Iran as a shining star, it's name is somewhat tarnished now. He noted further that one could be philosophical about such things, because it is impossible for any company to succeed entirely in such an undertaking, because so many circumstances and, in many cases differing factions combine to oppose any undertaking. It was suggested that the overall good for the country offsets any disadvantages that might accrue in the form of a tarnished reputation.

- Mr. Baird suggested that AT&T is quite concerned about becoming involved in any activity that would remotely be cause for AT&T to leave with anything but the same high reputation it had when it came to Iran.

The discussion ended with an offer by Mr. Reish that he would be pleased to provide whatever assistance he could to facilitate the AT&T team effort. Mr. Reish further expressed his own satisfaction that AT&T is giving consideration to providing much needed assistance to the Ministry of PTT and TCI.

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A luncheon meeting was held with Mr. E. C. McCollough, President of the McCollough and Company, Inc., Telecommunications Engineers and Consultants International, with headquarters in Washington, D.C., for unstated legal reasons according to Mr. McCollough. As already indicated, Mr. McCollough is the Co-Managing Director of the PMO, and it is understood that he reports to Mr. H. Herischi, the Managing Director of PMO. Attending the meeting were Messrs. Baird, Bright and Rickman of AT&T, and Mr. Garvin Shatts, Director of Operations for Hughes Aircraft. Mr Shatts was invited to attend the luncheon as Mr. Reish's representative, because the AT&T representatives were in the office of Mr. Reish when Mr. McCollough extended the invitation, and Mr. Reish was apparently invited out of courtesy.

During the discussion Mr. McCollough indicated that he was aware of the fact that the AT&T team was in Tehran holding discussions with the Ministry of PTT. He indicated that he was not aware of the message and outline of work requirements sent by Mr. Malek Abhari to Mr. Baird in connection with the instant visit. He further indicated that he was pleased that AT&T representatives were exploring this matter with the Ministry of PTT and TCI, and he further indicated that he felt a long range telecommunications plan is greatly needed by the country. He indicated his own feeling that such an undertaking is beyond the scope of the Ministry of PTT and TCI. He also indicated that AT&T might possibly take some work away from him, but he felt the effort by AT&T would be in the interest of the United States as well as Iran. Mr. McCollough also made a number of other observations in the course of general discussion as outlined below:

- He indicated that a number of pecple are opposed to AT&T providing assistance to PTT and TCI, and he emphasized that he was not one of those. Further discussion on this point revealed that Mr. McCollough was talking about equipment manufacturers, and he stated that to this knowledge no one in PTT or TCI objected to an involvement by AT&T. On the contrary, he pointed out that everyone recognized the need for the kind of assistance that only AT&T could provide.

- For the first time it was learned from Mr. McCollough that there is some difference of opinion between Minister Motamedi and Mr. Malek Abhari as to who will play a predominant role in the development of Iran's telecommunications network. In this connection, Mr. McCollough noted that Minister Motamedi is the Chairman of a three member board of shareholders which has responsibility for supervising the activities of TCI. On the other hand, it was pointed out that according to the law, TCI has responsibility for providing telecommunications for the country, and it was further indicated that Mr. Malek Abhari has influential friends at a very high level who apparently feel that he and TCI should play a predominant role in the provision of telecommunications services.

- It was indicated that the domestic satellite is especially important at this time because the 2M56 program must serve a large number of locations that have not yet been identified. In planning on a domestic satellite, maximum time will be allowed to identify the locations. Hence, the satellite can be planned and the earth stations can be installed at a much later date.

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A meeting was held with representatives of the U.S. Embassy on February 27 to advise of the presence of the AT&T team in Tehran, the purpose of the visit, and to provide a general insight into what AT&T hoped to accomplish when the team returns home. Mr. Henry Precht, First Secretary and Mr. Roger Brewin III represented the Embassy, and Messrs. Baird, Bright and Rickman represented AT&T.

After briefly reviewing the composition of the AT&T team, the general approach being taken by the team in connection with the current discussions with the Ministry of PTT and TCI, Mr. Baird also reviewed in a general way the results of recent discussions with Mr. Sotoodeh, Minister Motamedi and Mr. Malek Abhari. Reference was made to the fact that general discussions had been held with representatives of Hughes Aircraft merely as a means of learning as much as possible about the local situation concerning living conditions and various problems encountered by Hughes in locating employees in Tehran. Referring to the progress being made by the AT&T team, Mr. Baird further indicated that there may be a role that AT&T can play in providing assistance to the Ministry of PTT as well as TCI, but it was emphasized that a number of areas would require further clarification. More particularly, it was indicated that AT&T hoped to move ahead with deliberate speed but would want to think the matter through very carefully. It was stated that AT&T would not wish to get involved unless there is a clear need for our services and then only if there is a good chance for success. In other words, it was stated that AT&T is concerned that we do not involve ourselves in any activity that would remotely prevent AT&T from going away with as good a reputation as we had when we came here. Concluding, it was suggested that any comments the Embassy might care to make in this regard would be greatly appreciated.

Discussion continued relative to past discussions relating to the possibility of Bell System assistance in the development of the Iranian telecommunications network. In this regard Mr. Precht indicated that he and Mr. Brewin had met with Minister Motamedi in December 1974 to talk about the broad subject of telecommunications, and it was noted that there were also discussions about the September meeting between Minister Motamedi, Mr. Malek Abhari and Messrs. Bright and Rickman. It was the opinion of Messrs. Precht and Brewin that PTT has undertaken a very ambitious project to provide educational and entertainment TV and message telephone service to 1000 locations throughout the country. In this context it was stated that the Embassy is not knowledgeable about what role the Iranian military might play in this undertaking and, after making the point that the U.S. Air Force had vacillated a great deal in deciding what assistance it might provide in this undertaking, it was revealed that the Embassy is also not aware of the latest position of the U.S. Air Force in this matter. In this connection, the Embassy wished to know if AT&T planned to contact the military. It was indicated that the Air Force in Washington was informed of

the planned visit of the AT&T team to Tehran, and it was also indicated that because AT&T had been invited to Tehran by the Minister of PTT and the head of TCI, it was felt that no further discussions should be initiated by AT&T, although AT&T would be pleased to meet with representatives of the U.S. Air Force or the Iranian Air Force if they initiated the discussions. The Embassy concurred in this approach, but suggested that it should not be overlooked that General Ghatami has a great deal of influence with the court, and reference was made to the fact that General Ghatami is not happy that the military is not doing the job. The Embassy feels that the Iranian military is in no position to handle such an undertaking and the Embassy is equally certain that the U.S. Air Force could not handle such an undertaking. Reference was made to the fact that General Ghatami had originally gone to the Shah about the possibility of the military developing the national network, and the Shah had given him the responsibility; whereupon he immediately requested the assistance of the U.S. Air Force, but the U.S. Air Force did not act fast enough.

Referring again to the earlier discussions between Messrs. Precht and Brewin and Minister Motamedi in December, it was recalled that Minister Motamedi had expressed concern about the fact that AT&T would act as a consultant and provide equipment at the same time. It was also recalled that the Minister had also indicated that he was interested in keeping the responsibilities of a consultant and the providers of the equipment separate, although he did indicate that he could envision cases where it would be desirable to go sole source.

In talking about responsibility for the development of the Iranian National Telecommunications Network, the Embassy referred to the fact that Iran might also have a satellite corporation such as COMSAT. If this should come about the Embassy is of the opinion that the organization would be headed up by Mr. Reza Ghotbi, the current head of National Iranian Radio and TV (NIRT) and a very influential person. It was added that Mr. Ghotbi is very close to the court and is, in fact, a cousin or ex-fiance of the Queen. It was also suggested that Mr. Ghotbi is close to the Iranian military as well as to Mr. Mahiv who, as it has already been established is a backer and close associate of Mr. Sotoodeh, the alleged choice of the Prime Minister to be the in-country consultant to AT&T in the event AT&T agrees to assist PTT and TCI.

The discussion continued to center on the sources of power in the country in the contex of who might have the greatest influence with respect to an AT&T involvement. In this connection, the Embassy feels that Mr. Malek Abhari, the Chairman of the Board for TCI, may be as powerful as Mr. Motamedi, the Minister of PTT. The Embassy is not aware of who Mr. Malek Abhari's backers are, but it is believed to be Mr. Safia Asfia, who is Minister of State (without portfolio) and directly responsible for advising the Prime Minister on all matters relating to planning and budget. The Embassy also feels that the

current positions of Minister Motamedi and Mr. Malek Abhari may very well be a compromise between all of the parties at the highest level of government, namely, the Prime Minister and Mr. Asfia. The Embassy also knows of the importance of Mr. Mahiv and believes he is very close to the court and a backer of Mr. Sotoodeh. The Embassy also believes Mr. Sotoodeh left his post as Minister of PTT with the blessing of the court, and would, no doubt be helpful to AT&T in the capacity of consultant because of his standing with the court and also because he has the backing of Mr. Mahiv. In exploring the relationship between PTT and TCI, the Embassy indicated an awareness of the fact that the Minister of PTT is on the governing body of TCI, but the exact relationship is not known. It was explained that it is AT&T's understanding that the Minister of PTT also serves as the Chairman of a three member Board of Shareholders who are responsible for administering TCI, and Mr. Precht indicated this is also his general understanding.

In answer to a direct question relative to the Embassy's opinion regarding the merits of AT&T involvement in the development of the Iranian telecommunications network, Mr. Precht gave the prompt and unequivocal reply that it would be in the interest of the United States and would be good for Iran as well. It was added that such involvement would, no doubt, be beneficial to AT&T as well. It was also suggested at this point that Senator Percy should be contacted for assistance as he is very interested in U.S. industry involvement in Iran and would, no doubt, support an AT&T effort. Mr. Baird related that he had met Senator Percy on the way to Iran and had, as a matter of fact, told the Senator about the planned visit of the AT&T team.

Continuing, Mr. Precht stated his view that the main problems concerning TCI has to do with people, pay scales, management techniques, etc., and it was in the area of management techniques that the Embassy feels that AT&T has a great deal to offer. It was stated that Iran is willing to pay for such services but wants to go first class, hence the strong interest in the services of AT&T.

There was some discussion about problems AT&T might experience in stationing people in Iran, and it was generally confirmed that housing is in short supply and is expensive. It was also stated that pay scales are generally low and civil service wages are lower than the average. For comparative purposes it was suggested that a craft type person in the telephone organization (civil service) would earn about the same or slightly less than a taxi driver. It was indicated that many government employees remain with the government for security reasons and also as a means of building up a pension. In many cases such people also take a second job. It was also indicated that wives from poor families continue to refuse to work while wives from middle and upper class families do work. Good secretaries are in demand and secretaries with bi-lingual capabilities are in great demand as executive secretaries and are paid quite well. In conclusion, it was indicated that the Embassy would be pleased to assist in any way that it could in providing additional information in this area.

There was discussion relative to possible problems AT&T might encounter in stationing minority employees and particularly Jewish employees in Iran. It was the feeling of the Embassy that there is no reason to believe that there will be any problem whatever in this area. It was noted that Iran has a small Jewish population and has no problems in this regard.

In closing, Messrs. Precht and Brewin expressed appreciation for an update on the discussions between AT&T, the Ministry of PTT and TCI, and it was suggested that the Embassy would be pleased to assist in any way that it could. It was also suggested that the results of this discussion would be reviewed with Ambassador Helms who is very much interested in the discussions. In the way of a footnote, it was suprising to learn that Ambassador Helms was in Tehran at this time as it was generally understood that the Ambassador was still in Washington.

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A final meeting was held with Mr. Malek Abhari on March 1, 1975 to review the general conclusions reached as a result of the intensive discussions between representatives of the AT&T team and TCI. Present at this meeting were Messrs. Baird, Bright and Rickman.

Mr. Baird thanked Mr. Malek Abhari for the outstanding cooperation and assistance of his entire organization throughout these discussions. It was stated that as a tentative conclusion AT&T could indeed be responsive to the specific TCI requests for assistance, provided of course that AT&T could get the necessary government approvals, and provided further, that agreement could be reached relative to certain aspects of the requests for assistance. More specifically, it was noted that Mr. Motamedi had suggested in earlier discussions that there should be two contracts between AT&T and Iran, namely, one contract between AT&T and the Ministry of PTT, and one contract between AT&T and TCI.

Mr. Malek Abhari replied that he agreed with the position stated by Mr. Motamedi. In other words, it was explained that TCI will negotiate the contract for assistance on all projects in the process of being implemented. It was further explained by Mr. Malek Abhari that he had agreed to let the Ministry do the long range planning although it was emphasized that long range planning clearly relates to the responsibilities of TCI. Reference was made to the law which established TCI, and it was stated that the law defines the responsibility of TCI very clearly. By the same token it was stated that under the law it is very clear that frequency management is the responsibility of the Ministry of PTT.

Mr. Baird stated that it is generally understood that AT&T can give advice and assistance in many areas, but it was suggested that further clarification is needed relative to any further action that may be expected of AT&T in its role as consultant. Mr. Malek Abhari re-emphasized that he was talking about projects underway only. In other words, he suggested he was looking for assistance and guidance relative to projects other consultants are already implementing. As an example, he noted that the switching program is underway, but it needs to be reviewed and commented upon. He noted further that a transmission project is underway, but it is not known if it is the correct program. Specific reference was made to the fact that telephone service was initially planned for a few hundred locations, but this has now been increased to thousands of locations. Such requirements may or may not involve domestic satellites, it was suggested. It was emphasized that it is essential for some organization to look at all of the requirements as they now exist and recognize also that another 2-3,000 locations will be involved in the next 5-year plan. In other words, it was emphasized that in the fifth and sixth 5-year plans it would be necessary to clearly state a much broader plan. It was noted that the Ministry of Rural Development and the Ministry of Agriculture will have to develop the planned 3-4,000 locations. It was also noted that TCI has forecasted a maximum of 12 channels to all locations even though the demand is only about 3 channels. Again, it was emphasized that the long-range plan must also look at other plans and take this into consideration. The Ministry of Agriculture, it was pointed out, has only defined about 400 locations to date, but the long range plan must go further. In fact, it was pointed out that many of these locations are the same as those defined by the Ministry of Rural Affairs, and many may or may not impact on military locations. It was noted that INTS is already serving 200-250 military locations, but in the future it was suggested that the military may have many more locations. In this connection, it was emphasized that AT&T would have to talk directly with the military on this matter. For the present time it was noted that TCI is committed to providing the transmission facilities, but it is the responsibility of the military to make its requirements known.

Referring to the implementation of the transmission plan, Mr. Baird asked how the PMO would fit into the picutre as the PMO is not in the TCI organization but is a part of the Ministry of PTT. It was also suggested that it is generally understood that the PMO is responsible for transmission planning.

Mr. Malek Abhari replied that this is not his understanding, whereupon Mr. Baird asked what the role of the PMO would be in the next 2-3 years. Mr. Malek Abhari replied that this is a very delicate situation, and he would prefer that AT&T not get involved in the matter. He did say, however, that PMO is in the process of being phased out, and he is in the process of working out the details with Mr. Motamedi. He

further indicated that the reason he did not want to talk about the situation is due to the fact that he does not want people to know that they will not have a job in the near future. He emphasized that it is the responsibility of the PMO to implement INTS and "close up." During the next year it was indicated that 200 locations will be transferred from the PMO to TCI. Reference was made to a large chart which reflected those locations now under the responsibility of the PMO in blue and those locations under the responsibility of TCI were in red.

In the way of further clarification, Mr. Bright asked if TCI will have responsibility for international service, including the operation of satellite earth stations and underseas cables. Mr. Malek Abhari replied that TCI is now responsible for international service, including the operation of the Atlantic Ocean satellite earth station as well as the planned Indian Ocean satellite earth station.

Mr. Baird indicated that it would be possible for AT&T to provide assistance in preparing the transmission plan, but it was emphasized that AT&T would wish to protect itself against any possible claims of bias in connection with the preparation of specifications for equipment. Mr. Malek Abhari suggested that all such specifications should be prepared in such a way that a minimum of three bids could be entertained; and then if AT&T is uncomfortable about the situation, it was suggested that TCI would call upon a third party to evaluate the tenders. It was recognized by Mr. Malek Abhari that AT&T would wish to maintain the highest ethical standards in all such operations.

Continuing, Mr. Baird suggested that AT&T could also offer assistance in the area of management and results. Mr. Malek Abhari immediately suggested that he is looking for assistance in the following areas:

- logistics and spare parts,
- maintenance and operation, including methods, procedures and quality control,
- management information systems, and
- development of a data base.

In addition, Mr. Malek Abhari indicated that he would like to establish a group of people to train his people to take over the operation. For example, he suggested that he would like to establish a group to do the traffic and multiplex plan. In this connection, it was recognized that a multiplex plan has been done by the PMO, but it was also recognized that TCI must now relate the multiplex plan to traffic requirements. When it was suggested that perhaps AT&T could be of assistance in bringing together the activities of the various groups, Mr. Malek Abhari emphasized that AT&T would be expected to update a modern traffic and multiplex division. He further suggested that he had done nothing on the multiplex plan but would expect that AT&T would

only work with TCI on this matter. In fact, he suggested that the AT&T group should be located at the 2M56 building. Mr. Malek Abhari offered the further information that he had in fact talked to NTC of Japan about assistance in this area but had postponed a decision when he learned that AT&T was willing to discuss the possibility of providing assistance.

Mr. Malek Abhari continued by saying that the 2M56 program will be the future of TCI. He noted that GTE will be hiring close to 2,000 people to train to take over when GTE leaves the country. It was indicated that it is not expected that AT&T will provide a similar service. It was suggested that AT&T would receive inputs from the consultant doing manpower training at an early date. It was also suggested that there is a large integration function to be performed, although it was recognized that some integration is being done at the present time. It was also suggested that the transmission plan has its implementation plan, and it was stressed that maintenance and operation should be a part of this work. Finally, it was suggested that should AT&T undertake the job as outlined, it would also be expected that AT&T would assume some of the day-to-day work currently being handled by Mr. Malek Abhari, although it was indicated that this is another delicate area and would be pursued in depth at a more opportune time.

Mr. Baird suggested that AT&T would wish to include a provision in the contract whereby AT&T would have periodic executive reviews relative to the work being performed by AT&T, and it was indicated that such reviews would be in addition to recurring written reports. Mr. Malek Abhari replied that he would welcome such a procedure, and he added that it should be done in a way that would include the military and NIRT and thereby make a very smooth operation.

In concluding, Mr. Malek Abhari suggested that it must be recognized that TCI may have to establish a position where there may be differences of opinion. As an example, it was noted that at this time the military has enough channels, but data transmission is coming into being and will result in large transmission requirements. TCI does not want to start everything now but must develop a recognized body to do things in a very determined way. It was the opinion of Mr. Malek Abhari that this can be done even though there was not time to do it in the past. Reference was made to the fact that Iranian law makes it very clear that the responsibility belongs to TCI, and a copy of the Article of law establishing TCI for this purpose was provided as a matter of information, although the article is in Farsi.

Mr. Baird indicated in closing that he would return to New York and review the findings and conclusions of this visit with the management of AT&T, after which he suggested that he would be in contact with Mr. Malek Abhari. It was also noted that while AT&T would wish to study this matter in detail, it could be expected that such deliberations would proceed with dispatch, and some decision would be reached within a month.

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A final meeting was held with Mr. Motamedi on March 1, 1975, to review the general conclusions reached as a result of the intensive discussions between representatives of the AT&T team and the Ministry of PTT. Present at this meeting were Messrs. Baird, Bright and Rickman.

Mr. Baird expressed appreciation on behalf of all of the AT&T representatives for the excellent reception they had received in all visits to PTT offices. It was indicated that a meeting had been held with Mr. Malek Abhari just prior to this meeting, and it was further indicated that the possibility of two contracts had been explored with Mr. Malek Abhari. It was noted that Mr. Malek Abhari had been informed that AT&T could be responsive to the requests of TCI for AT&T assistance in a number of areas, provided, of course, that AT&T could get the necessary governmental approvals and, provided further, that we can get a satisfactory clarification relative to the specific role that AT&T would be expected to assume. More specifically, it was emphasized that AT&T could readily assume the role of "assist and advise" as opposed to a role of implementing projects. With these caveats it was also indicated that AT&T could be responsive to the requests of the Minister for assistance in the development of a long-range plan.

Mr. Motamedi expressed satisfaction with the position as outlined by Mr. Baird; however, he offered the further clarification that the development of the long-range plan would be closely associated with the on-going projects. He noted that as the long range plan is developed the AT&T group would be dealing with human and technical resources, the development of specifications and, at the same time, offering comments and assistance to both the Ministry of PTT and TCI. It was recognized that the on-going supervision of the various projects would be done by the consultants or contractors handling the projects, and reference was made, as an example, to the fact that GTE would be responsible for supervising the switching project. However, it was stated that AT&T would be totally responsible for new projects from beginning to end, and it was suggested that such responsibility would include, in addition to the overall supervision of the project, the preparing of specifications, the preparation of tenders, the selection of the contractor, the awarding of the contract, training, and any other activities that are required to insure that the job is satisfactorily completed. In this contex it was added that there is an immediate need to enlarge many microwave locations which would also necessitate additional training in the area of maintenance and operation. It was suggested that the AT&T group would provide a nucleus of people to train the locals in what to do, how, the logistics of the effort, etc.

Referring to the area of domestic satellites, it was asked if the Ministry of PTT had decided that a satellite system was needed and the AT&T role would be to determine how such a system can best be used or, if the Ministry of PTT had not made a decision in this area, would it be expected that AT&T would make a study to determine if a satellite system is required?

Mr. Motamedi replied that it is known that satellites will be used for educational and entertainment TV; therefore, it should be assumed that other agencies such as PTT and TCI will use the satellite to provide for telephone, data, medical, and other services. Therefore, it was indicated

that AT&T would be expected to study all of the requirements for satellite, as well as existing and planned terrestrial requirements, and put all of these requirements together to size the system for the present as well as for the future. In this connection, it was emphasized that it would be necessary for AT&T to work with the military, various ministries, banks, businesses, etc. with the objective of satisfying all requirements by microwave and satellites in the near future and perhaps coaxial cables in the distant future. All of these responsibilities were further defined as "first stage" efforts.

In the "second stage" it was suggested that AT&T would be responsible for drawing the specifications, supervising tenders and awarding contracts. It was emphasized that all of these efforts would be for the Ministry of PTT. In addition, it was recognized that TCI would require AT&T assistance in handling specific projects involving logistics, data switching, maintenance and operation of microwave and satellite facilities, etc. It was also stated that there may be other types of companies formed under TCI to do other specific projects. In summary, Mr. Motamedi emphasized that this is a very complex approach which must satisfy immediate needs and anticipate future requirements so that a master plan can be developed.

Mr. Bright introduced the subject of measuring any AT&T efforts in this area, and he suggested that it had been found from past experience that the best way to monitor such efforts is through periodic reviews at the executive level. It was suggested that such reviews could be scheduled with the Ministry of PTT and TCI to review what we are doing, and it was added that such reviews would be in addition to formal reports. In addition to monitoring the AT&T efforts at the executive level, it was pointed out that such reviews would enable key people in PTT and TCI to follow the progress of the AT&T efforts at the same time, and would also afford the AT&T executives the opportunity to hear directly from PTT and TCI management if things are not going to their entire satisfaction. In this fashion it was suggested that we adopt the so called "red flag" report to indicate the need for special attention.

Mr. Motamedi indicated that he agreed with the suggested approach; however, he indicated that the AT&T effort should be divided into two parts. As an example, he assumed that a contract has been signed between AT&T and the Ministry of PTT for a master plan. Under this contract Mr. Motamedi suggested that AT&T would be looking at immediate requirements plus requirements for the next 25 years. For the long term effort it was suggested that PTT would not require on-going reports but would prefer to look at the plan itself.

In developing the master plan, it was suggested that AT&T would, of necessity, become involved with individual projects. In this area it was suggested that a substantial degree of monitoring would be required to insure that the various projects are implemented on time. Emphasis was placed on the necessity to know the status of each project

at all times and also the effect of one project on another and on the entire plan from the standpoint of manpower requirements, technical resources, etc. The satellite project was named as an example of a project that should be monitored closely, and it was suggested that this requirement would also involve data, switching and transmission projects as they all have to come together as a basis for the master plan. Referring to the idea of "red flag" reporting, it was agreed that such a procedure would be effective and particularly so in view of the fact that all kinds of revisions will no doubt be required in many areas. Another example of a project that would require continuing monitoring was in the area of maintenance, operation and logistics. Mr. Motamedi suggested that he wanted to have a very smooth and up-to-date system, and he added that this is an area where a computerized PERT system should be developed.

Mr. Baird referred to the fact that a senior AT&T official would be stationed in Iran, and he would do most of the supervision, but it was indicated that someone from the headquarters office, perhaps Mr. Baird himself, would come to Tehran occasionally to hear about what is going on. Mr. Motamedi agreed with this concept and noted that a number of details would have to be worked out later. He added that there is a very great need to coordinate many different elements and, because of this, there is a chance that something could be missing. He agreed entirely that continuous monitoring of all of these diverse elements would be essential.

Concluding, Mr. Motamedi stated that his country and his Ministry were depending on AT&T to come to Iran and provide very valuable assistance. The Minister added that as for himself personally he was depending 100 percent on the ability of AT&T to perform this very important service with distinction. As a matter of interest, when Mr. Baird suggested that AT&T recognizes that this is a major project and is, in fact, concerned about the remote possibility that unforseen circumstances might combine to prevent AT&T from doing a totally satisfactory job, Mr. Motamedi dismissed such fears promptly and suggested that if he had entertained any fears whatever that AT&T could not overcome all obstacles he would never recommend AT&T for this very important undertaking. He also stated that his entire government is of the same opinion.

Mr. Motamedi asked when he might be advised of AT&T's decision in this matter. Mr. Baird indicated that he planned to return to New York at which time he would review his findings with the staff of AT&T. It was stated that while AT&T would no doubt wish to study this entire matter very carefully, it could be anticipated that a decision would be made in the near future. Assuming a favorable decision by the executive committee of AT&T, and also assuming the necessary governmental approvals, Mr. Baird suggested that a statement of work could be prepared in one month, and the contractual discussion could commence

immediately after that. Mr. Motamedi expressed his complete satisfaction with this approach, and he added that he recognized the need for AT&T to discuss this matter very carefully, and he added that he agreed entirely that as much time as is needed should be taken to consider this matter. He added that he was looking forward to working with AT&T in the future, and he expressed his thanks to Mr. Baird and the AT&T team for coming to Tehran to discuss this matter.

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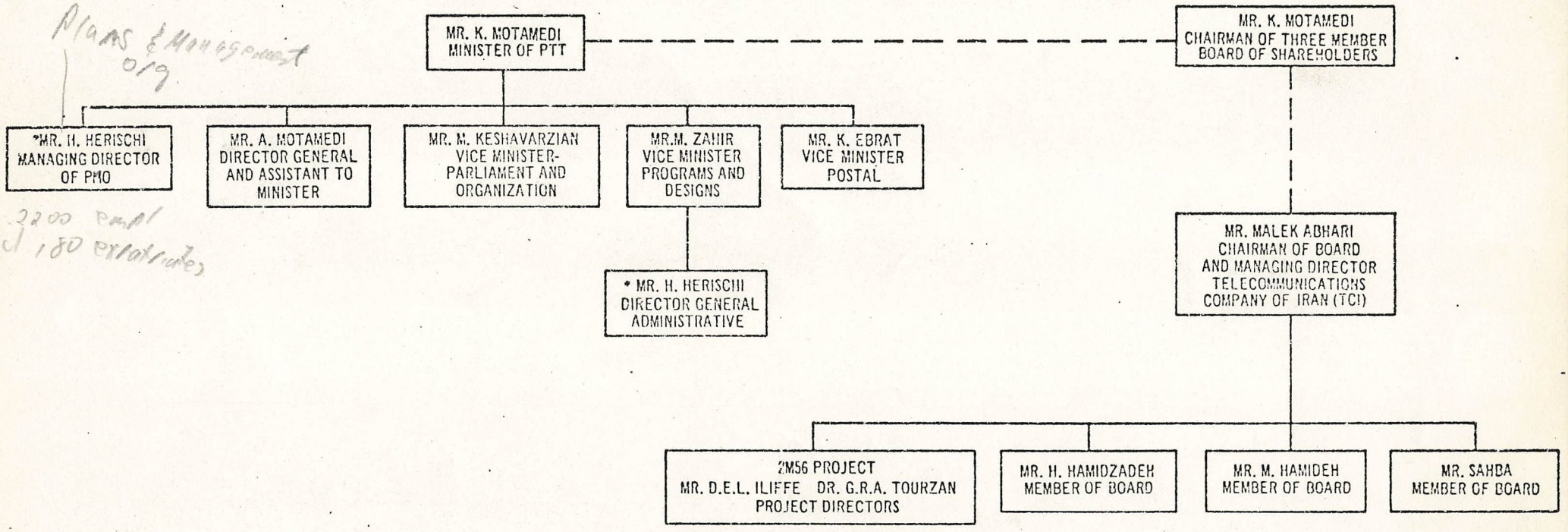
HMR

AT&T Team Representatives

Mr. J. A. Baird -	Vice President, Engineering and Network Services, AT&T.
Mr. R. Bright -	General Manager, Government Projects, Western Electric.
Mr. R. D. Dalziel -	Director, Engineering and Network Services, A.T.&T.
Mr. J. A. McCarthy -	Director, Network Objectives and Private Network Planning, Bell Laboratories.
Mr. G. Spiro -	Director, Local Switching Engineering Center, Bell Laboratories.
Mr. R. C. Harris -	Engineering Manager, AT&T Long Lines Department.
Mr. H. M. Rickman -	Staff Manager, AT&T Long Lines Department.

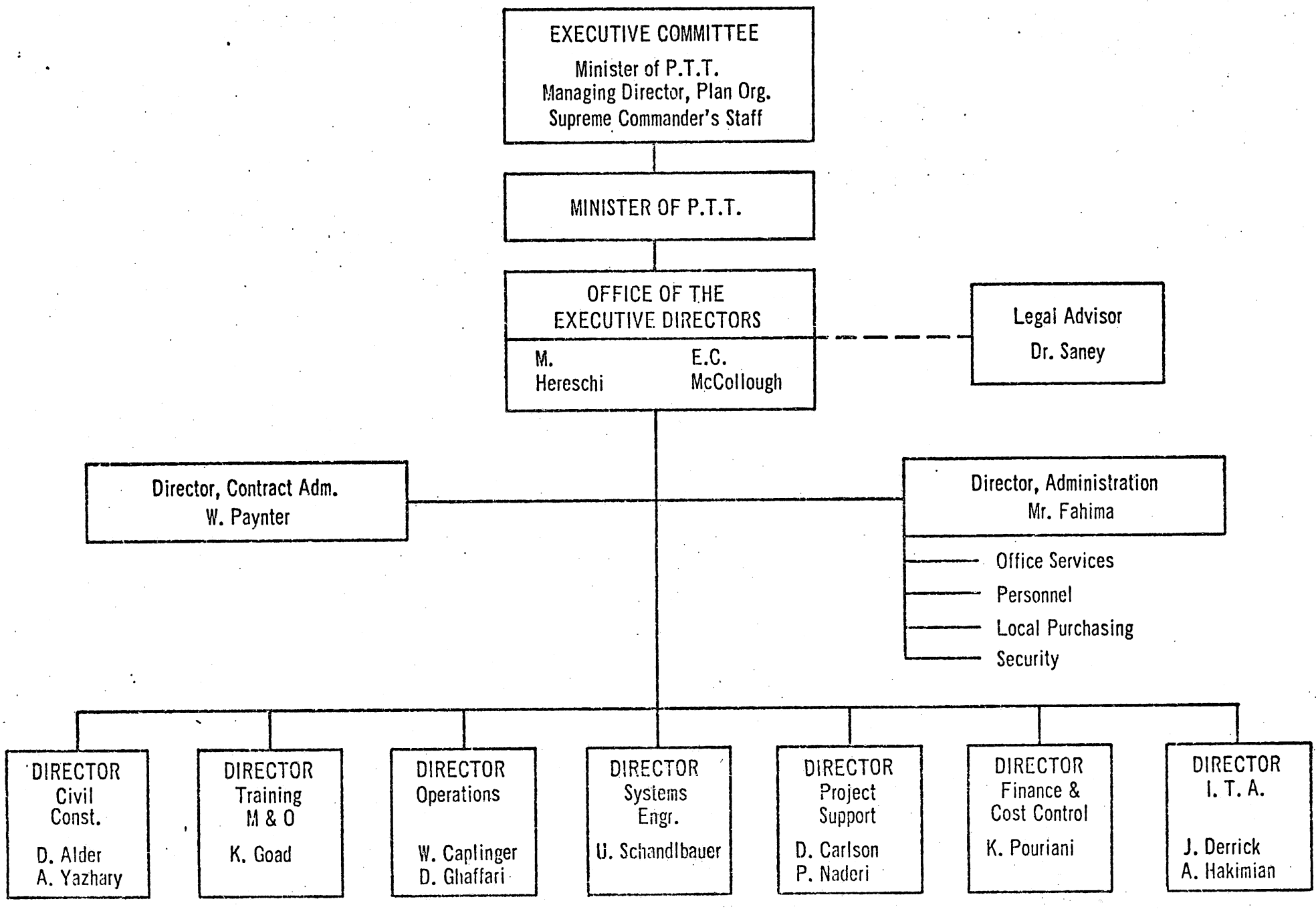
MINISTRY OF POSTS, TELEGRAPH AND TELEPHONES
AND
TELECOMMUNICATIONS COMPANY OF IRAN



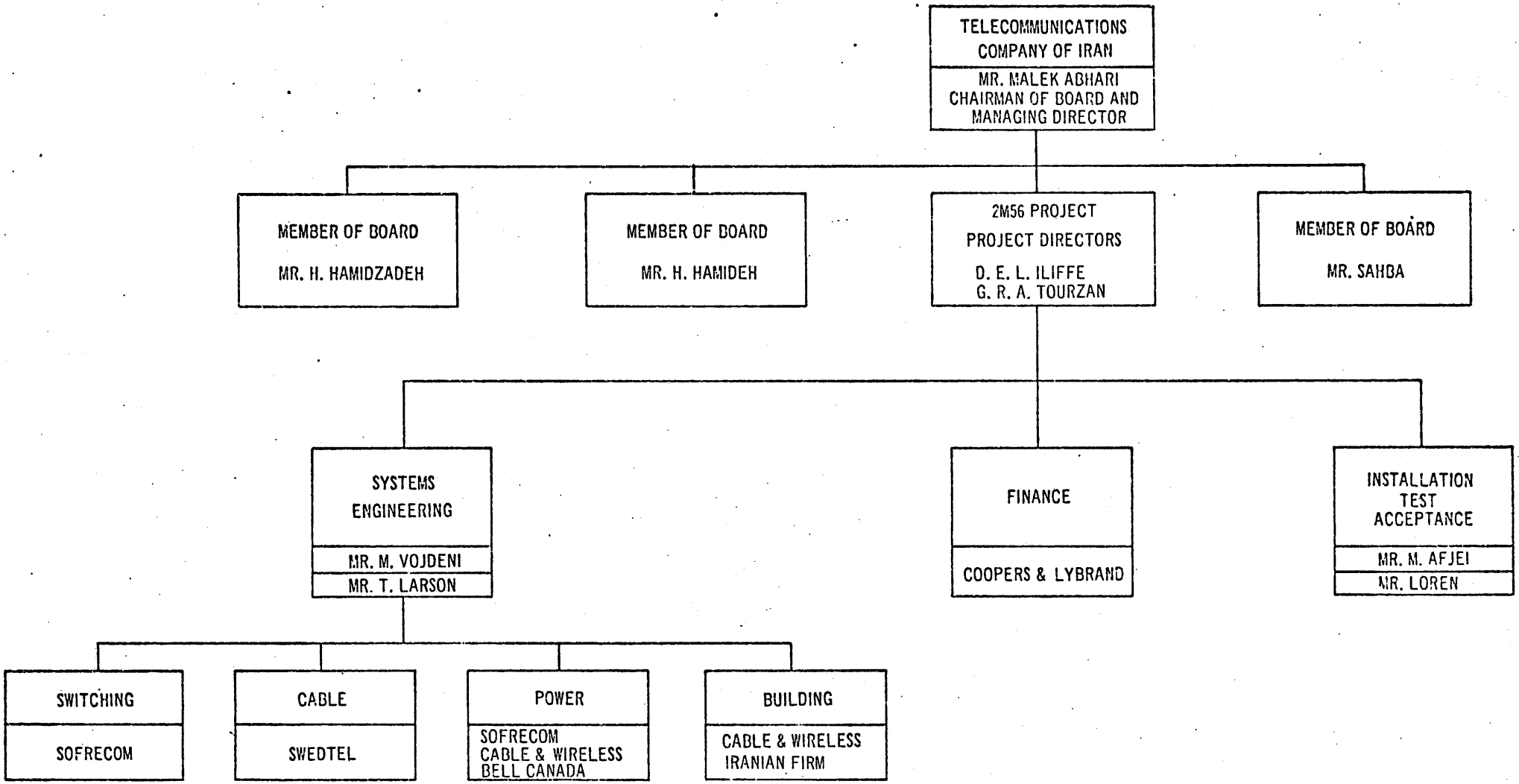
*MR. HERISCHI HAS A DUEL RESPONSIBILITY

Attachment 2

PLANNING AND MANAGEMENT ORGANIZATION



INTS-PMO



Attachment 4

Amar Abbas Hoveyda	Prime Minister
Safia Asfia	Advisor and Assistant To Prime Minister
K. Motamedi	Minister of Posts, Telegraph and Telephone
S. Malek Abhari	Chairman of Board, Telecommunications Company of Iran
Reza Ghotbi	Chairman of National Iranian Radio and TV (NIRT)
General Ghatami	Chief Iranian Air Force
General Jablonsky	Chairman, Consortium NEC, GTE - Italy, Page, Seimans
H. Mahiv	Financier
F. Sotoodeh	Former Minister, P.T.T., now President of Isiran
Richard Helms	U. S. Ambassador
Henry Precht	First Secretary, U. S. Embassy
Charles Brewin	Counselor, U. S. Embassy
George Reish	Vice President Hughes Aircraft, Iran

R. D. DALZIEL

Introduction

During the period 2/22/75 to 3/1/75, I visited Iran as part of a 7 member Bell System team.....our objective was to learn enough about the country and its telephone system to enable us to intelligently prepare contracts for possible future consultant work. An interviewing approach was used though, of course, in the time we had, each aspect of the telephone business received only surface attention. Discussions were held with all levels of management and, where time permitted, field visits were made to observe conditions. There was good cooperation on the part of the Iranian telephone people throughout this endeavor, though at times, the language problem made obtaining the facts a difficult task indeed. As the operations member of the team, this report will focus on that aspect of the telephone business. The format will be to include a brief summary of my observations in each area and then add preliminary conclusions and possible areas of future support. Ten functional areas were studied during the week; the report has been organized along the lines of those functions;

1. Organization and the Management Process
2. Network Design
3. Network Administration
4. Central Office Maintenance and Frame Operations
5. Repair
6. Installation
7. Operator Services
8. Commercial Operations
9. Directory Operations
10. Computer and Billing Operations
11. Circuit Order Issuance and Control
12. Service Productivity and Volume Measurements

For the convenience of the user, the names of contacts in each area of operations, where obtained, are included at the beginning of each section of the report.

I Organization and the Management Process

Mr. Khalili - Head-Organization and Methods Office - TCI HQ
Mr. Norberg - Swede-Tel Consultant - 2M56 Building

Observations - Organization

The operation of telecommunications in Iran is performed by at least 4 relatively independent organizations - all under Mr. K. Motamedi, Minister of PT&T. These organizations are:

A. The Telecommunications company of Iran (TCI)

B. TCI-2M56, the special organization charged with moving Iran to 2 million phones by the Iranian year 1356 (Starts 3/21/77 on our calendar).

C. Project Management Organization (PMO)

D. Directorate of Network Control (DNC).

A 5th organization, not under the control of Mr. Motamedi - the military, also impacts heavily on telecommunications in Iran

A chart of the top level of the PT&T organization is shown as Attachment 1. Charts are also attached for TCI and PMO, based on discussions with individuals in those organizations. Despite numerous requests, I was unable to obtain copies of formal organization charts. There seem to be many unofficial lines of reporting throughout PT&T which makes the construction of organization charts difficult and apparently politically unwise. The following discusses what we did learn about each of the organizations mentioned above:

A. TCI

The Telecommunications Company of Iran has 15,000 people with 7-8,000 more programmed to come on the payroll during the next 3 quarters. It has overall responsibility for telephone service in Iran but does not have total authority to provide that service -the Project Management Organization and the Directorate and Network Control having responsibility for implementation of long distance transmission capabilities. I was urged not to even look at the present organization of TCI (See Attachment 2) as change was stated as being imminent; Mr. Malek Abhari head of TCI said he planned to adopt a "Modular" approach to his organization in the near future. At another point, however, I was told that the modular approach would be implemented on a trial basis in just one section of the country and not for another 11 months! Changes in the TCI organization were proposed a few years ago by the Swede-Tel consultant, but little was done to implement the recommendation (See Attachment 6) except in the comptroller type operations. The forthcoming modular organization was described to me as being a self sufficient decentralized one - with some independent cost or profit center modules being responsible for various staff services.

Of interest in the existing TCI organization is the situation with regard to the four top level jobs reporting to Mr. Malek - Abhari. The person hired to head up the finance and supply operation resigned, while the personnel and administration and maintenance and operator services jobs are being run by two of the members of the Board of Directors (See chart) - This may or may not be a permanent arrangement. The other member of the Board of Directors, Mr. Hamidzadeh formerly ran the engineering and construction operation but has recently resigned from that responsibility.

B. TCI - 2M56

This organization, co-directed by Mr. D.E.L.Iliffe (expatriate) and Mr. Ray Tourazon (Iranian) has responsibility for implementation of the 2M56 program. Mr. Iliffe and Mr. Tourazon report to Mr. Malek Abhari. No chart of the people reporting to them was obtained. It is known that Mr. Sabet handles the PERT functions and seems to be the chief assistant to Messrs Iliffe and Tourazon. The organization includes numerous expatriate consultants.

C. PMO - Project Management Organization.

This organization (See chart - Attachment 3) is charged with building the long haul transmission network. Reporting to it is the GenTel, Page, Siemens, Nippon consortium - which is doing much of the building. In the PMO organization chart, it should be noted that all of the directors job with the exception of finance have both an ex-patriate and an Iranian director. Further information on PMO's organization may be obtained from Mr. J. McCarthy, a member of the AT&T team, who visited PMO to discuss organization.

D. DNC (Director of Network Control)

This organization (See chart - Attachment 4) is charged with placing long distance communications systems into actual service. Details of the work of this organization are contained in Management Report 1 dated 11/73. (Attachment 5). Observations concerning the work are found in Section XI of this report.

E. Military

No studies were done of the communications requirements or actions of the military. They do interconnect with the public switched network and they do have heavy special services requirements and heavy traffic volumes. These requirements will have to be integrated into the overall plan for the Iranian telephone system; currently the approach is to simply (and inefficiently) overlay their requirements.

Observations - The Management Process

In this area, we are on most shaky ground - our exposure was brief - but my overall impressions of the week are as follows:

A. The five organizations listed above clearly do not work together. The lack of adequate facilities and, perhaps, the mini-struggles for power - are causing all to sub-optimize.

B. Iranian Telephone Managers lack authority and seem to be afraid to make decisions. Before giving me a report, for example, it was necessary for four different levels of management to "check with the boss" to be sure and that it would be alright. Such lack of authority slows the management process.

C. There is a clear lack of sufficient measurement of the service being given to customers in Iran and so there is a clear lack of measurement of the managers providing that service.

D. We witnessed many cases of people apparently standing around in various work situations. We were told numerous times about the lack of incentive for the people working-in terms of low pay and lack of upward mobility-and that the job being civil service was, therefore, "fireproof." Our impression is that this climate is affecting service and productivity in Iran.

E. Some of the problems, of course, are the same ones we have. For example, I was told about the lack of responsiveness of the Controllers organization when it ran computer programs for other organizations in the company - a problem some of our Operating Telephone Company Managers still complain about.

F. The idea of having both Iranian and ex-patriate directors is a good one for the long term health of the Iranian telecommunications system. There would seem to be operational difficulties related to the splitting of authority. My conversation with the director, however, indicated that the method is workable and that the two people generally learn to get along with each other. There was some hint that the ex-patriate consultants, in some cases, neglected their training role in favor of performing the more specific contract work.

Conclusions and opportunities for Future Support

Given the nature of Iranian business politics, as observed during our one week stay, and the abortive attempts of the Swedes to recommend organizational changes in TCI, I suggest that organization is not an area where we could be of much help. We could assist them in putting together salary studies which might give them ammunition to use with the government ministers, and put together job descriptions for functions within the existing organizations (to define the training Job) but everyone is an expert on organization - including the Iranians.

II Network Design Mr. Daryoush - TCI Headquarters

Observations - Current Situation

The present network in Iran has about 500,000 lines working including 300,000 in Tehran. Dial Service, using five and six digit numbering schemes (and perhaps others) without alternate routing - is provided in 58 cities (see network map-Attachment 7). The network has a 4 level heirarchy; apparently, there a lack of routing discipline -- though this impression is based on hearsay.

Tehran has 35 exchanges and seven tandems. The present "star and mesh" design of the Tehran network limits ultimate growth to 80 exchanges ("1" and "0" not usable) - leaving 80-2 digit combinations: first number indicating which 'star' and the second - which exchange in the star. A new configuration has apparently been proposed by the French consultants - details were not obtained.

The switching centers are the modern EMD SXS, the older Strowger type SXS, and reportedly, one X-Bar office of unknown manufacture. The Tandem ("Junction") offices I saw in Tehran are EMD SXS.

The existing exchanges were designed by the German (Siemens) consultants for TCI Based on extensive German and brief Iran experience. The basic Design was for 4.5 CCS/Line. Recent counts (see network Administration) indicate that 3.5 CCS per line would be more appropriate for design. Mr. Daryoush feels that they are somewhat overengineered, particularly

in trunking, as a result of the high design "pick". He also quoted a 10 to 1 station to trunk ratio. Other design standards include .5% EMD SXS line finder loss (not delay) and B.02 for trunking.

The current phones per 100 population figure is 1.72 - one of the lowest in the world. The waiting list in Tehran was reported to be 110,000; elsewhere in Iran it is 72,500 - but the stiff cost to get on the waiting list ($150) followed by a wait of years - probably masks true unmet demand. There are few residence phones and one estimate was that the military has 1/2 of the long distance circuits.

Observations - Future Plans

The 2 million phones in 1356 goal is well known (1000 locations - of which 500 now exist - homing on 60 locations (or less if satellites are employed), but there are some interesting details that go with the 2 million figure. An objective is to install 1358 demand capacity in 1356 and, in 1358 - to be able to meet requests for service in 1 month - as per general European standard. They expect to grow to 12 telephones/100 population in Tehran, 4-5/100 in cities with, say, 5000 people, and 7/100 in cities with 50,000 to 100,000 population. The magneto service, which exists in small cities today, will be completely eliminated in the current 5 year plan. No telephones will be provided for locations with less than 300 population in the last census (8 years ago). Population growth has been forecast using that 8 year old census as a base - and modifying it per known growth in some larger cities.

It is expected that traffic engineering of C.O. additions, now done by the Siemens people, will be undertaken by TCI "in 2 years". The capacity of present offices is established solely on number and line equipments installed. Coordination of building, C.O. equipment, and cable was stated to be a major problem; we saw this in 2 locations and were told of another. In one case the building and C.O. installation were being performed simultaneously - with enormous safety hazards to the people working and obvious risk or damage to C.O. gear. In the other observed case, a new directory assistance bureau sits idle - awaiting completion of trunking. Finally, we heard about an office installed before the building was even close to being complete; it operated for several months protected from the elements by a roll of corrugated metal.

2M56 Program Position Paper Number 4 (Attachment 8) gives an excellent picture of the Network Design problems facing Iran.

Conclusions and Possible Areas of Future Support

Network Design has been essentially a consultant function - and with the C.O. consultant being also the manufacturer - an undesirable (for the long term) situation exists. The forecasts and usage data available are inadequate for any kind of precision job - and the state of current network service would distort any data obtained - perhaps to a point of making it useless.

The picture obtained suggests that much could be done to:

1. Establish design rules, integrating the hardware of Siemens and GTE - if they have the ESS contract.

2. Undertaking the Job of planning the local and toll networks to incorporate more efficient alternate routing strategies - using more modern switching hardware.

3. Developing a system for integrating building, cable, and C.O. installation - based on our New York experience; and

4. Putting together training courses to make the Iranians self sufficient in the Network Design field.

III Network Administration Mr. Daryoush - TCI Headquarters
Current Situation

This section of the report will be very brief since little is being done in the Network Administration field (There are no forces identified as 'Administration').

- Data - There are no regular measurements, of traffic, volume, blocking etc. - in fact, there is no Data available except some recently completed visual counts of SXS selectors off normal and a few special operator ticket counts. The Network Design people complained of "no power" (authority) to restore available traffic registers to service.

- Assignment - This function is handled at the C.O. by the C.O. maintenance or repair forces. There was no evidence of any balance or preferential frame assignment considerations (and the latter did not seem to be required in view of frame size) - though the actual assignment function was not observed.

- Network Performance Optimization - This is generally a C.O. maintenance function in Iran. The network management function (overload control) was explored by R. Harris as part of the restoration of facilities function of the Directorate of Network Control.

Future Plans - Data

8 'VGA' Traffic Measuring Systems of German manufacture are in the process of installation in Tehran and other cities. The first is to be working in a month in one office pending completion of the necessary Data Links (another indication of the coordination problem). The data will be sent to Germany for processing on a Siemens 4004. Plans are to convert the programs to work on a Honeywell 6025 and then do the processing in TCI headquarters in Tehran.

Autrax - ICUP (Individual Circuit Usage and Peg Count) has been demonstrated and apparently will also be purchased - but details were not readily available. A discussion with a Telesciences Corporation officer here - indicated that they were still in the dark regarding Iran intentions.

Conclusions and Possible Areas for Future Support

As the Iranian network grows to meet demand, the network administration functions will become more important. Transition management, data collection, trunk servicing, load balance, etc. need to be organized and implemented or Iran will not get the service it is paying for.

We could provide support in organization and methods. Included in that support would be planning for a Total Network Data System and for network management - short and long term.

IV Central Office Maintenance and Frame Operations Mr. Draji - District 6 Manager

Observations

We visited the Daneshgah (University) exchange which was later described to us by Mr. Tourazon as a "showplace". The office contained both the older Strowger equipment and the newer EMD SXS. The central office was clean and the records we saw were apparently well kept but I was unable to assess the number of people assigned to do maintenance in this office or their effectiveness. We had been told that the effectiveness of the central office maintenance people was a serious problem. Most people we talked to wanted to discuss the trouble related to loop cable. The figures we did see on central office troubles, suggested, however, that this was a considerable problem also. No service observing type records exist but they did record the number of troubles they had found per month by type in the Daneshgah office. They were runnning at a rate of 1,000 central office troubles per month for their 20,000 line office or five central office troubles per hundred lines. This figure must be used with care, however, since it was from one building and apparently does not include test OK's. Furthermore, we were not able to determine the rules they use in counting reports and so any valid comparison with Bell System figures is not possible. As noted above, we did learn that the Telesciences people had demonstrated their ICUP system a few months ago and were able to demonstrate that 30% of the equipment of a sample office was out of service or defective. This, too, suggests a serious C.O. and trunking maintenance situation, but more in-depth studies would be required before this conclusion could be confirmed.

Observations on two main frames during the tour indicated that the frames are generally not large enough to give any problems. A substantial number of dead jumpers were observed but none of the frames observed looked to be in trouble. It should be noted that because of the held order situation, there is very little movement on the frames and so it is not surprising that they were not in poor shape. The frame layouts were ordinary by our standards; the soldering work ranged from excellent (new offices) to mediocre.

2 offices being installed were visited on 2-26-75. The Boulevard exchange, which was to cutover in 10 days with 10,000 line capacity-used an all Iranian TCI craft force. It was a good looking EMD SXS installation. The frame was conventional but used a new high capacity solderless horizontal block. There was no traffic measurement included in the job,

and the emergency diesel was nowhere to be found; we were later told that it would be installed "in 30 days". The batteries were labeled "Varta" of approximately 15" X 30" X 36" dimensions. In addition to the two repair positions adjacent to the MDF (standard in Iran) - there was a room full of new message registers - to be read manually after cutover.

The other new exchange was called "Zafar." It was a nightmare of building construction, mud, and C.O. hardware - but the installation work again looked good.

One final observation - we were told that the GTE ESS gear, which Iran apparently will buy, includes provision for centralized maintenance capability.

Conclusions and Opportunities for Future Support

The first priority here would be to accurately measure the quality of service being given by the Iranian offices. This is easier said than done - since we don't know the quality in some of our own SXS's. Following that evaluation we probably could be of assistance in establishing control maintenance type plans, assisting them in setting up the training, and doing operational planning for the utilization of mini computer based maintenance systems. As for the frame, there will be a need for some frame engineering guidelines once the size of the offices grows beyond 20,000 subscribers.

V Repair Service — Mr. Draji - District 6 Manager
Mr. Nievi Pur - Head - Maintenance and Installation - Tehran

Observations

We observed the Repair Service Operations during our trip to the Daneshgah Central office. Repair Service facilities are located right in the central office adjacent to the main distributing frame. Test positions look to be of an ordinary variety. Calls are directed to the "bureau" by dialing 17; since there is no assistance operator or intercept service (operator or recorded) all calling difficulties are referred to these offices. In the Daneshgah office there were very cramped conditions for the repair attendants - in part, it seemed, because there were more people than required.

Samples of the records used in the repair operation are shown in Attachment 9. Of special interest may be the record kept of reports by telephone number - apparently used to keep repeat reports out of the repair work flow and to dismiss those felt to be exhibiting characteristics of station troubles (e.g. a recent report on which no trouble was found).

During a six day period in Februay, the approximately 300,000 lines in Tehran had the following trouble report experience:

Trouble Rpt. '17'	Trouble Rpt. Mgmt	Number of '17'Rp.Closed	Type of Trouble C.O.	Cable	Cbl.in Subsr. Building	Post to Subs.	Station
17771	4033	7547	389	427	714	4588	10714

Time to Fix Trouble 24 Hrs	48 Hrs	72 Hrs	<72 Hrs
4040	1140	603	255

This information was obtained without report instructions so that some caution is warranted in interpretation - but it is safe to say that Iran has a high trouble report volume (e.g. 5X 17771/300000 = 29.6 reports per 100 lines) and that the exposed subscriber cable plant ("post to subscriber") is the major culprit.

All of the subscriber cable plant is below ground in Tehran from the C.O.'s through two distribution points, the 'LV' and the 'KV' until it reaches the building or buildings to be served by a 10 terminal post. The lead and paper pulp cable is seriously exposed to the elements at this point (See Attachment 10 for pictures of subscriber cable plant). There were several comments made by TCI management which suggested that any amount of rain caused serious service disruption.

It was also mentioned that a Japanese contractor will undertake rehabilitation of this plant in Tehran - but no details were obtained.

Coin box repair operations were also observed. The operation looked sloppy with many people standing around in a cramped room. Stacks of coin banks were laying on a counter; the ones we picked up were full of money. We also saw the new coin box at the Coin repair office. It apparently has the capability to handle higher coin denominations (than the 2 rials handled by the present box) and-to either show the user how much has been deposited or how much he has left of his original deposit - I'm not sure which. No pictures of either old or new coin boxes were obtained but a picture of the standard outdoor booth (almost all coin installations are outdoors) is shown in Attachment 11.

Conclusions and opportunities for Future Support

A bad situation is apparent - I suspect that the obvious subscriber cable problem is masking others, e.g., central office. We have a great deal of experience with subscriber cable problems and could recommend corrective action to complement the rehabilitation program. We could also work on Repair Service Bureau methods and training, including coin box operations.

VI Installation of Customer Lines

Mr. Nievi Pur - Head-Maintenance and Installation - Tehran

Observations (Mr. Jian Ahmadi - District 9 Manager)

I first spoke with Mr. Nievi Pur. He is a very busy man who, characteristically of Iranian telephone people, picked up his telephone and was interrupted by subordinates throughout our conversation. In additon, one phone (he has several on his desk), rang persistently throughout the interview.

As noted "under repair" above in Tehran, the customer line goes from the central office building underground to the first distribution point, called the LV, to a second distribution point, the KV, which is located on the ground (See picture in Attachment 10). From there, the line goes to the building location out of the ground to what they call the post, usually mounted on the side of the building or wall typically anywhere from six to twelve feet off the ground. The post has, for example, ten terminals with subposts of eight or six terminals capacity also mounted on the side of the building (See Attachment 10).

The subscriber performs his own inside installation. At the time of installation, he is given one station set. He can buy extensions at any one of large number of telephone stores located in the city. (see Attachment 12) The newer buildings in Tehran are prewired with outlets for both electricity and telephone (see Attachment 12). Telephone wires are run in the same ducts with the standard 230 volt electrical wires. The sets purchased in the stores cost as little as $9. There is no control of interconnection; it was stated that they feel they have a serious problem, but were unable to quantify it.

Some recent Tehran statistics related to the installation job are shown below:

	Lines in Service	New Subscribers This Month (23rd Day)	Available Numbers	Public Telephones: Attended	Public Telephones: Hospital and other Public Buildings	Public Telephones: Outdoor Kiosk
Total	268907	841	36,988	40	345	1141
High Bldg*	NA	299	10,000	24	67	90
Low Bldg *	NA	0	0	0	0	0

* 25 Buildings with working C.O. equipment in Tehran.

I was able to learn a little about the waiting list for service in Tehran. The records I was given indicated the highest waiting list serial number which can obtain service in a given exchange. There were 4 buildings in Tehran where one could obtain a phone "immediately" (1 month). The highest serial number noted was 353,155. The highest number for the bazar area was 135,054 - where I was told that 5 year waits have occurred. As noted under "Network Design" above, the total number waiting for service in Tehran is 110,000.

The installer uses a truck (have a wide variety - see Attachment 13) to drive to the address that he is given - equipped with a ladder, hand tools, wire, and a clip-on hand set. When he finds an open terminal, he calls back to the office and relays this information. (See Attachment 14 for pictures of an installer at work) He has no paper "order", relying instead on verbal communications with the dispatcher. At the MDF, the frameman works paper orders in serial form. Attachment 15 shows samples of the Network (Installation) department cable record card - which includes all customer information - and an MDF serial order form.

It should be noted that the long waiting lists have produced a situation where people sell their line to the highest bidder. The extent of the installation involvement in this activity or the extent of installation work in the "outside move" area was not determined. There is no apparent means of measuring the quality or speed of installation work, but I was told that an installer could do 10 or 11 a day in business locales, fewer in residence.

Conclusions and Opportunities for Future Support

It is obvious the existing low level of installation activity will change rapidly in the next few years or even the next few months. The Iranians are apparently not geared to do this additional work and we might be able to assist in the areas of lower level organization, measurements, training, and methods. It is also apparent that a tariff revision on station set installation is required. At the very least, some certification of station sets offered for sale in telephone stores is needed. Incidentally this situation might offer an opportunity for our interconnection people to study what happens when unlimited interconnection is permitted.

VII Operator Services

Observations

I visited four different offices, all in Tehran, and two attended centers, one in Tehran and one in Shiraz. The attended center is apparently where the ordinary citizen makes a toll call in Iran.

The International center was visited by most of the team; Hank Rickman of Long Lines is most familiar with this operation. All calls are handled on a delayed or appointment basis. Operations were very quiet during my visit. All the operators were dressed in uniforms (as they were in the other operating centers.) A new pneumatic tube system has just been installed to route call requests from one group of operators to the other. This system does not appear to be cost effective. Both this switchboard and the National one (See below) used old style cord boards with a trunking multiple but no answering jacks.

Both attended centers were somewhat chaotic especially the one in Tehran; people were obviously waiting for long periods to make their calls. Conditions were similar to that experienced in some of our poorer government facilities; I was reminded of an old Motor Vehicle Bureau. Conditions upstairs at the National Center switchboard were not much better. Large numbers of people were sitting standing around, there were cups of tea on many of the operating positions and little evidence of productivity. Again the two operators handling every call approach was used.

I visited one directory assistance center (dial "118") - forty positions of microfiche directory using the Panto-Diaskop system from Switzerland. The call distributor was said to be a Siemens product. I was told that this was the single directory assistance bureau in Tehran. Conditions were more orderly here; the operator, using the microfiche system, took a fiche from her file, put it on a desk surface, and used a swinging mechanism to locate the correct page. No productivity figures were available but 90+ % occupancy was apparent for the period we were there (and was apparently the rule for this office.) We were told that "The operators go crazy here" meaning that there was always a call waiting to be handled by an operator-which was a real contrast to the operations in the toll centers. The directory assistance operation was apparently a more disciplined operation; there were quality observations being taken on individual operators and they stated that they took periodic individual productivity studies of their people's work. There did seem to be too many supervisory type people standing around, but this could have been related to our visit. When I inquired about force management, I learned that there is no force adjustment as we know it. Because of the overload on the bureau, they simply work 4 shifts a day with all women working the shorter day shifts and all men on the longest night shift.

I also visited the new directory assistance bureau to which all directory assistance calling will be transferred shortly. It has 90 positions versus 40 in the old, all of these positions were ready to go including an IT&T Pentaconta call distributer, but the trunking was holding them up, apparently a coordination problem. The same Panto-Diaskop microfiche positions were to be used in a new bureau.

As for intercept service, there is none; I understand from Fran Austin, Director, Operator Services at AT&T, that this is not unusual outside of the U.S.A.

Conclusions and Opportunities for Future Support

A. It is evident that the present operator toll calling setups are inefficient and are producing poorer than obtainable service, at least in terms of delay. There would seem to be a need for facility planning (I do not know the extent to which this has been undertaken) including TSPS. We might also be able to help with improved methods at the existing centers.

B. In the directory assistance bureaus, it is apparent that as operator availability begins to meet demands, there will be a need for force adjustment. As in the case of toll services, new measurements, methods, training and an evaluation of present and future facilities plans might also be done.

VIII Commercial Operations

Mr. Mirfkhrae - Manager Not Interviewed
Mrs. Arshar - Assistant Supervisor - Subscriber Affairs I
Mrs. Asady - Supervisor - Subscriber Affairs II

Observations

I visited the subscriber Affairs department at the corner of Kachjamshei and Hafess in Tehran. A Mrs. Afshar gave me full particulars with regard to Subscriber Affairs Department I. This is the office where new installations are handled. The office was an incredible mess, with binders stacked everywhere. These binders contained files on people who were on the waiting list for telephones in Tehran. Apparently the chaotic situation is to be relieved by decentralizing to 7 different Tehran locations. In any case, this little room, with hardly enough space to move around in, was where, I was told, angry shouting people inquired each day about the prospects for obtaining a telephone. It should be noted that all business in the subscriber affairs department is handled in person; no business is transacted over the phone. The would be subscribers' routine for obtaining a telephone works like this: first they make application and pay about $150 to the Bank of Iran. This bank sends receipts to the Subscriber Affairs I office. When the waiting list number for the subscriber comes up, a request is made for service from the Subscriber Affairs department to the Central Office - for a "technical check". If the Central Office determines that it can provide telephone service, i.e., that it has available cable to the subscribers' location, assignments are made of cable, line equipment and a number and the order is returned to the Subscriber Affairs office. At the same time, the central office sends out an invitation letter to the customer, telling him that his telephone is about ready and that he should pay about $180 more to the bank of Iran. The bank sends a receipt to the central office, and the phone is connected. Advice is sent to the Subscribers Affairs department by the central office; They, in turn, make a file folder of all the records and send it to the Subscriber Affairs II department, which takes care of existing customers. Records for every telephone in Tehran are kept in a huge basement file room at the same location. It is a very crowded file room, but neat. The records are not duplicated at any other location so the risk of record destruction would seem to be significant.

In the Subscriber Affairs II department, I talked to Mrs. Asady, a supervisor. The work of this department includes transfers of phone locations and transfers of names of subscribers. As mentioned earlier, one can purchase a phone line from another subscriber in Tehran; the current market for such phones, is $2500 to $3500. In Subscriber Affairs II, the names of the buyer and the seller are recorded - and arrangements are made to transfer the records. Incidentally, to dampen the speculation in telephones, a person must keep his phone 2 years or more before he can transfer it to another name. This bureau also keeps the name and telephone number card records which provide a directory record base.

Conclusions and Opportunities for Future Support

The Subscriber Affairs operation was one which begged for methods help. It is not working well - and when word gets out that telephones are to be made more readily available, this operation will be snowed under - with its manual records and archaic methods of transmitting information. Though the decentralization plans, which I did not get to review, are undoubtedly designed to allievate the situation, I think there is much to be done in mechanizing the service order flow and streamlining the customer handling and records.

IX Directory Operations

Observations

During my week in Iran, I did not see a single telephone directory, though I looked and asked for them on several occasions. They are, apparently, published only infrequently, with people relying on their own telephone list and newspapers for the numbers they need. Directory operations were observed in two locations. The first was in the Subscriber Affairs department II. There, card records were maintained - with a complete file of Tehran subscribers by name and also another file by telephone number. These cards were 3 x 5 and very neatly lettered. The other location was concerned with micro-fiche production for the directory assistance bureau. Fifteen people were crammed into one rather small room, and using typed card inserts in frames that were periodically photographed, they produced micro-fiche. Presumably, the same process is used for production of the printed directory, although this was not observed.

Conclusions and Opportunities for Future Support

Based on my brief observations, I believe that they have a relatively low efficiency operation with quality an unknown. Methods help in records mechanization, directory compilation, and distribution might be provided with significant benefits, assuming the detailed analysis supports my initial conclusions.

X Computer Center and Billing Operations

Mr. Ali - Zadjmoul - EDP Manager - TCI Headquarters

Observations

The computer center is located in the basement of TCI headquarters. It includes a dozen or more key punch positions and an IBM 360/25 computer with disc storage. Present plans call for conversion of existing programs to cobal language and installation of a Honeywell 6025 computer, Honeywell apparently having been given a government franchise for operations in Iran. When I asked what programs are run besides the billing process, I was shown a flow chart of a Honeywell inventory system for cable and other gear. From the looks of it, it is an "off-the-shelf" package. They plan to start running it in about 2 months.

As for billing, they work on a 2 month cycle. Message registers are read manually in the central office by maintenance personnel. The

message register reading sheets are key punched and processed through the computer to produce a bill which is similar to ours in format. I did not observe the toll billing process, though I did see paper ticket billing media in the toll Operating Centers.

Customers pay their bills to the bank, the bill stubs are stamped and returned to the comptroller's office for recording.

Conclusions and Opportunities for Future Support

A. We have a wealth of telecommunications application software packages. If these could be made available to the Iranians, they could profit greatly. One major problem, however, would be the maintenance of these programs following the conclusion of our efforts. This might be overcome, in part, with longer term contractual arrangements.

B. The billing process used is like the one we used twenty years ago in the Bell System. The ability to further mechanize that process is limited by the input of paper toll tickets and message register reading sheets. We should be able to provide much technical support in the billing media area (e.g., optical scanning of toll tickets, AMA, or even message register photography). This should be followed by the software support necessary to utilize the more modern media.

XI Circuit Order Issuance and Control

George Edwards - Director (Expatriate) - DNC
Mr. Mansoulshani - Co-Director (Iranian) - DNC
Clayton Benner - Director of Network Planning - DNC

Observations

The Directorate of Network Control (DNC) organization is charged with responsibility for issuing circuit orders for cable and microwave, for doing private line assignments end to end, and for rerouting, restoral, and overall control from the Sepah Square Network Control Center. DNC reports directly to Mr. Motamedi but it must rely on PMO for money, people, and authority. There is, accordingly, some fear that it has become a satellite of PMO.

We visited the control board at Sepah Square early in the week. It has a big map on the wall with many lights winking, duplicating alarms from 36 long haul transmission maintenance centers. People at the control board were uncertain or at least inconsistent as to what the lights meant and there was a lack of any response to the alarms evident. Talking with Mr. Edwards later, he opined that the board was not well designed - "it doesn't work. " He noted, for example, that it doesn't indicate where calls are being blocked but does show when the door is opened to the maintenance center.

On the subject of Network Planning, Mr. Benner, who worked for Page before joining DNC, stated that there was no real planning based on measured needs being done but rather all planning was based on various agencies rather old estimates of future requirements. He described the situation as being "helter skelter".

On the subject of records, Mr. Edwards indicated that there was a funding problem. They have no printing facility but need to issue fifty thousand circuit layout records. I was shown the records and noted that the inventories of facility and equipment are kept by site, including what is supposed to be on what equipment bay in an office. They also have channel records with cross-references to the circuit layout records. All the records I saw at the Department of Network Control were neat but I was advised that the same would not hold true in the field. The records they use seem to be modeled after those used in the Bell System. I obtained two sample circuit orders (see Attachment 16).

The major problem evident at the Department of Network Control was the problem of coordination, a prime function of the department (see organization section). The problem centers around the objective of conforming to a 1970 fundamental plan for circuit use called the NCCRL or MUX 577C. This plan shows the construction and utilization of the LD Network that was authorized in 1970 by Mr. Motamedi. DNC is unable to tell what is actually constructed by the consortium of consultants; much of the work is not what was originally asked for by the Ministry (changes authorized but all parties not informed), and of course construction may be delayed beyond the original schedule. Orders, however, are issued based on an assumption of 577C conformance. The Department of Network Control compensates for this with surveys of their own - which produce a multiplex plan based on what they believe is really there - and which they described as not resembling 577C - "a terrible mess."

Another related coordination problem stated was that DNC (or other users) must get Motamedi's OK to deviate from the NCCRL or 577C-whatever the Department of Network Control judgment might be as to relative priorities. There is no single point where customer requirements come together in some person or persons (lower than Motamedi) to evaluate the best means to serve. For example, there is a new cement plant being built and there were no plans to serve it on the original 577C. It will take Motamedis O.K. to take circuits away from some previously stated 577C need though it may be perfectly obvious to the Network Control people that the circuits they plan to use are not presently required. The military, e.g., General Tabacoli (J6) goes right to the Prime Minister if they can't get what they want regardless of what the 577C says. Apparently, they get what they ask for.

Still another coordination problem relates to the fact that numerous organizations maintain the various piece parts of the long haul transmissions system. For example, INTS is maintained by N.T.E., Siemens, Gen Tel, the microwave to the ground station for the satellite by TCI etc.

It was also noted that field personnel advised of the completion of circuit orders on the six wire MUX portion of circuit orders only and no one gives any advice on completion of special services. Mr. Benner also complained that he might have a circuit which works on three different systems, only one of which is operated by PMO. He could go to TCI to ask them for information on such a circuit - the information would be on the wall of the office where the meeting was being held-but TCI would state that they could not give him the information. He feels that the reason

for this behavior is that TCI feels "that they should have this business." He has established a customer services committee, on which he hopes to eventually include TCI, to improve the customer service situation through better cooperation. He stated that this committee was still exploratory and included his own membership, PMO Engineering, and PMO Operations.

Conclusions and Opportunities for Future Support

It is obvious that the Iranians are operating in a classic demand exceeding capacity mode with everyone trying to get as much of the pie as they can. The country needs some priority setting machinery and perhaps this machinery will be more acceptable as capacities start to meet demand. The necessary methods work would be relatively easy, but gaining the acceptance of it would be a most difficult job in a country where influence apparently means so much. As for records, there is a chaotic situation regarding what is out there vs. what the circuit order people think they have. This has to mean lost facilities and equipment and lost production as people spend time looking for what isn't there and reissuing orders when the original order cannot be worked. We could help with procedures for records discipline, priority settings, and forecasting, but it would take high level acceptance and enforcement of them to effect real improvement.

XII Service, Production, Volume Measurement

Observations

There was little evidence of management control information during our field visit. A few people, including Malek-Abhari, talked earnestly about the need for a management information system, and stated that there was no data, or close to no data, available on the performance of the telephone system. I was able to obtain, however, some useful information on Repair and Installation (see those sections of the report) but only after Pur - head of plant operations in Tehran, Sabet -second in command to Tourazon and Iliffe, Tourazon himself, and presumably Malek-Abhari OK'd its release. The experience does suggest that there may be other management information which has only minimum distribution. I do know that there is no network data other than troubles found. The maintenance report does show a "time to fix" breakdown - a service measurement - but I seriously doubt that, for example, the wait in the attended offices or directory assistance accuracy or speed of answer etc. have significant measurement - in any form. There is, of course, no such thing as service observing in Iran.

Conclusion and Opportunities for Future Support

The present state of measurement of service and costs may be suitable for a vastly overloaded five-hundred thousand line telephone system but it will be a serious road block in the system when capacity starts to meet demand and efficiency starts to become a concern. TCI management seems to recognize this but I sense only the vague management information system hopes - but perhaps, as noted above, there is more information which is being utilized. In any case, a first order of priority for Iran should be a basic measurement system for both design and management

control-widely disseminated to the managers responsible for that control. We have great experience in this area and ought to be able to provide assistance in gathering, processing, and distribution of the information and the establishment of appropriate management objectives based on the data. As for management information systems, we have a number of computer packages which are used to alert management to the status of operations; some of these might be easily tranferrable to Iran - though I suspect that there is a lot of basic measurement effort needed before Iran moves to the mechanized management information system level of sophistication.

Two notes of caution: First, if the seemingly harmless information regarding repair and installation operations is so confidential - then it may be that the introduction and utilization of basic management measurements may be much more difficult than the development of them. If only a few people know the score, it isn't much of a game.

Second, the management system needed for Iran is not the one used in the Bell System. The people who might work in this area will have to think "small" in one sense. Any new measurements and related objectives ought to be geared to the short term growing pain years ahead and be related to Iranian standards of quality and speed rather than those of the United States.

XII Closing Remarks

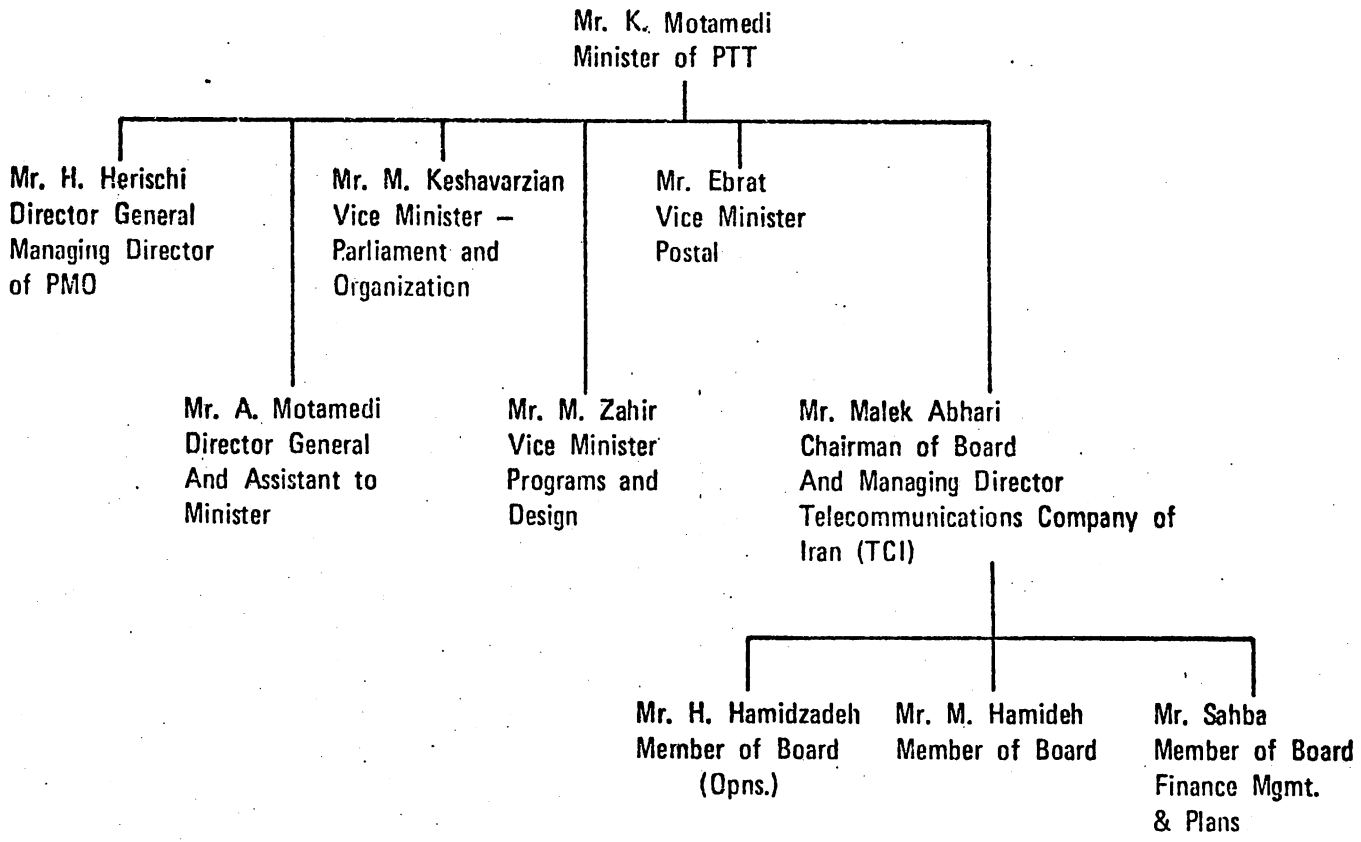
The state of the present telecommunications system in Iran is a serious drag on the growth of its economy. One needs only to have tried to get in touch with someone else during the course of a visit to Tehran and dial 15 times before getting through-or watch a travel agent spend half an hour transacting five minutes worth of business over the telephone to understand the problem. Adding large amounts of equipment is only part of the job (as our own New York experience shows). Operating the existing and planned network and its supporting functions is equally important.

Irans most serious present telecommunications problems, aside from shortages of local plant, are 1. the coordination of activities under various operating arms of PT&T, 2. the related organization problems - TCIs organization chart has big gap apparently related to an inadequate salary structure, 3. a lack of adequate measurements to assess the quality of service, productivity and to design the future network, and 4. a tariff which permits unlimited interconnection of station gear. The most serious problems ahead are the hiring and training of the vast numbers of people needed to operate the greatly expanded system and the initiation of a professional planning process so that growth will match Iran's priorities. I believe that AT&T has a unique capability to help with these problems.

RDD
3/21/75

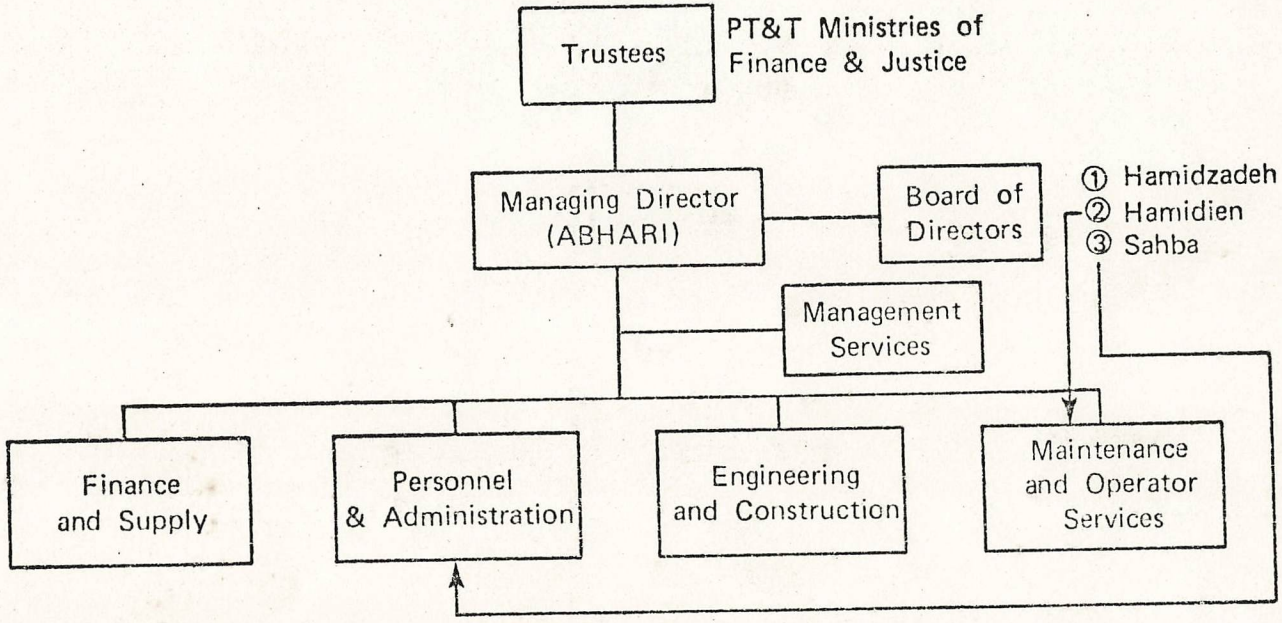
Attachment 1

PT&T Organization



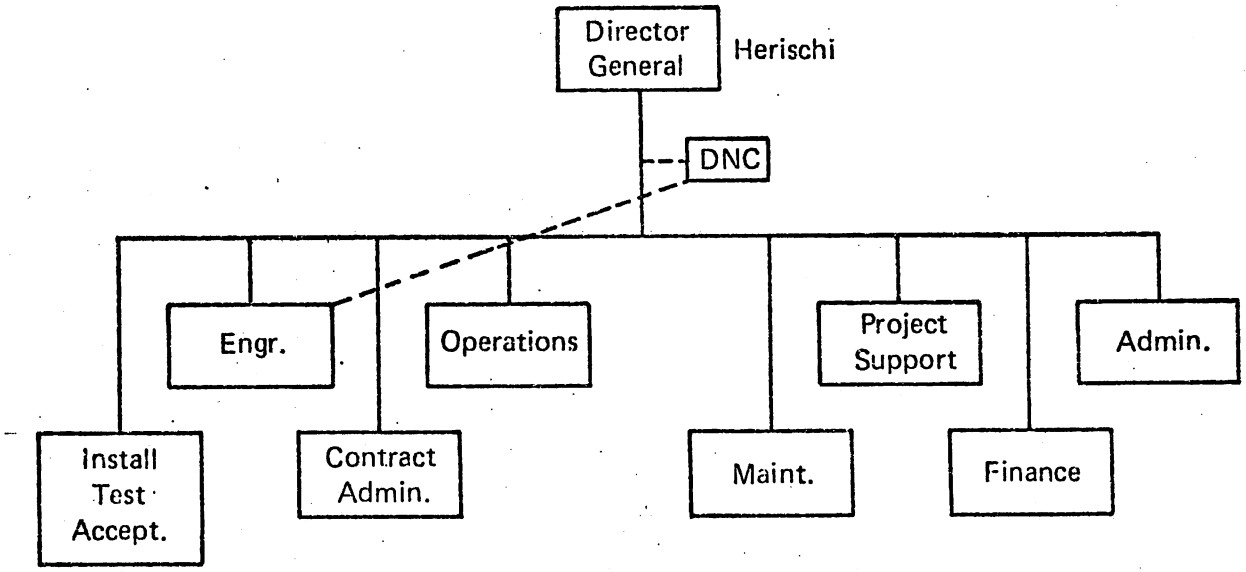
Attachment 2

TCI Organization



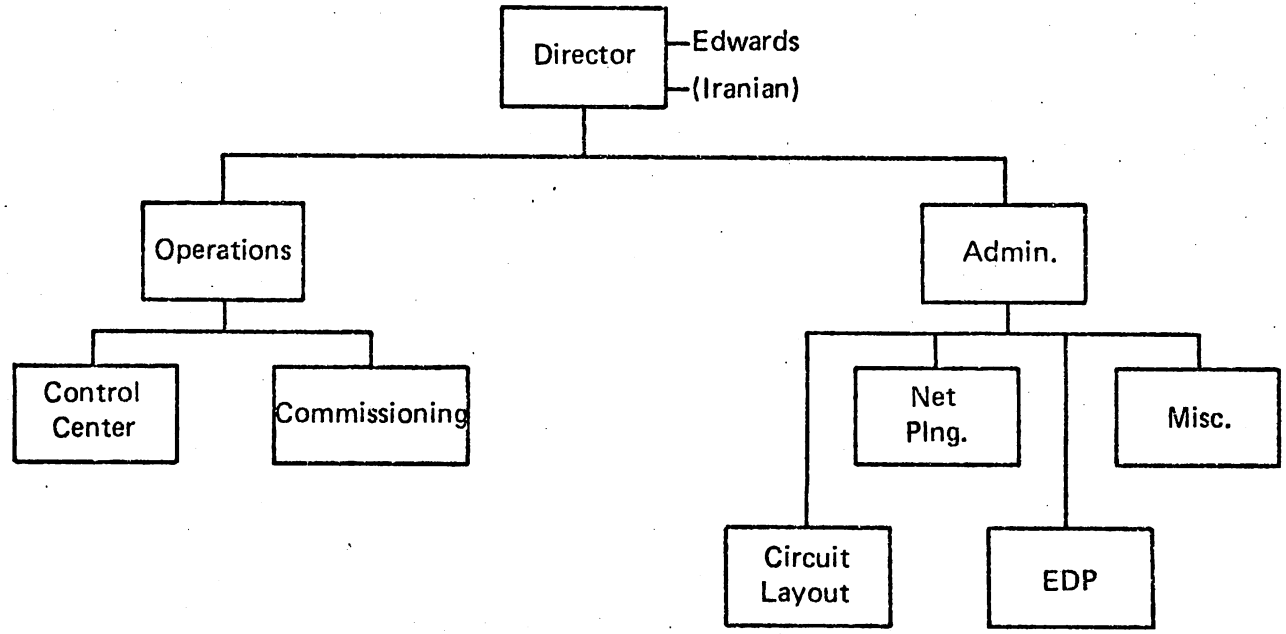
Attachment 3

PMO Organization



Attachment 4

DNC



Attachment 5

IMPERIAL GOVERNMENT OF IRAN

Ministry of Posts, Telegraph & Telephone.

Directorate of Network Control

MANAGEMENT REPORT NO.1

November 1973

MINISTRY OF POSTS, TELEGRAPH AND TELEPHONES

DIRECTORATE OF NETWORK CONTROL

Contents

DIRECTORATE OF NETWORK CONTROL

HISTORY

Early in 1972, as the first portions of the INTS became operational, it became apparent to the PMO that under it's terms of reference it was not specifically responsible for nor did it have the proper organizational structure to place the system in actual service.

To do this efficiently and on a continuing basis an operational organization structured to coordinate closely with the existing PTT and ITC service departments and the many other agencies and potential users of the INTS service would be required. This new organization must also control all systems other than the INTS for which the PMO had no contractural obligation, since the commercial service on all systems must be fully coordinated and integrated. In short, the new organization must be totally service oriented and properly organized to establish and coordinate all service on allsystems of the Iranian Long Lines Network.

Thus the Directorate of Network Control was born in the Spring of 1972 and received it's formal authorization from the Minister of PTT on 8 June 1972.

DIRECTORATE OF NETWORK CONTROL

AUTHORIZATION

(translation)

PTT NO. 2753/230
Date: 8 June 1972

TO : Program Management Organization

SUBJECT : Establishment of a long Distance Telecommunications Control Unit.

For the purpose of implementing the preparation of orders to install telecommunications circuits, perform interconnections, turn over channels and exercise operational control over the various systems such as INTS, 7-Links, Cento and the Tehran-Assadabad-Kermanshah systems and also STD, a unit for telecommunications systems control has been set up at this Ministry. This unit will report directly to the Vice-Minister for Projects and Research and will cooperate closely with INTS-PMO.

This is to announce the establishment of the above unit and request that the necessary cooperation be extended to this unit in all respects.

SIGNED : Fathollah Sotoodeh
Minister of PTT

(now called the Directorate of Network Control)

COPIES TO : PMO,NTB,NEC, NTC, TAI, NIRTV, SCS/J6, GNPS, PCE, RCA, SIEMENS AGENCY.
IRAN TELECOMMUNICATIONS CO. (ITC)
M/W Dept.
Telegraph Dept.
Planning Dept.
Wireless Dept.
STD Project Executive
General Director of Communications PTT

DIRECTORATE OF NETWORK CONTROL

MISSION AND RESPONSIBILITIES

Simply defined within the framework of it's Ministerial authorization the DNC's mission and responsibilities cover three major areas:

1. To implement actual commercial service on the total Iranian Long Lines Network as rapidly as operational facilities become contracturally available.
2. To exercise operational control over all systems and operate and maintain the technical means to provide continuous monitoring of service/system status with the authority to direct the restoration of any service/system interruption.
3. To plan definitively for total network expansion to meet Iran's future telecommunications needs and to make specific recommendations as required to the Ministry of PTT for the timely implementation of these additional requirements.

DIRECTORATE OF NETWORK CONTROL

MAJOR ACTIVITIES

From the experience gained in one and one/half years of actual operation the DNC has developed a well defined range of activities designed to efficiently perform the above described Mission. These generally include:

1. To receive, evaluate in the light of available facilities, and process all requests for long distance service on the total Long Lines Network.

2. To design the transmission of, write circuit orders for, and direct the implementation of specific circuits from end-to-end.

3. To plan for and direct the cutover of all facilities into commercial service as they become operational by PTT acceptance from the contractor. To provide complete service to end users requiring facilities not covered contractually DNC will, if necessary, design, plan and actually install.

4. To staff, operate and maintain the Communications Control center at Sepah. The function of this Center is to maintain overall continuous system status monitoring and to give specific directions to the M&O Department in the restoration of any service interruption. For this purpose a Master Re-route and Restoral Plan for the entire network will be used.

5. To perform general and specific planning functions in all areas related to future network development and expansion. These efforts will be designed to keep the available long distance facilities abreast or ahead of Iran's actual requirements. This includes activities in the various planning areas of traffic flow studies, transmission requirements, facilities and switching requirements. It also includes a continuing study of the efficiency of the existing STD network trunking design. These planning activities are fully supported by a comprehensive electronic data processing program. From these planning activities will come specific recommendations to the Ministry for the timely future expansion of the long distance facilities to meet Iran's increasing communications requirements.

DIRECTORATE OF NETWORK CONTROL

MAJOR ACTIVITIES (cont'd)

6. To inaugurate and maintain a continuous "in house" training program in the various DNC activities in the several communications disciplines. This program is structured to provide trained Iranian personnel to assume maximum responsibility in the shortest possible time.

7. To develop and establish a modern electronic data processing and computer capabilitydesigned to provide support to all DNC activities in areas where computerization can produce maximum efficiency.

DIRECTORATE OF NETWORK CONTROL

CURRENT ACTIVITIES

A partial list of the currently active (November 1973) programs under development by the various departments of the DNC is given below:

1. Design, engineering and installation of a Master Distribution Frame at the Sepah Communications Center.
2. Development of a system-wide Reroute and Restoral Plan.
3. Development of, in cooperation with the Operations Directorate, PMO, a terminal interface equipment installation program.
4. Development of a formal on-the-job training program for Iranian personnel.
5. Development of a complete set of Standard Operating Practices for all systems in the Long Lines Network.
6. Five specific computer programs as follows:
   a. PTT Circuit Requests/Status Report.
      Computer runoff of all service requests (NCCRL) against facilities available.
   b. INTS Logistical System
      Computer runoff of complete equipment inventory of sites and depot spares.
   c. National Radio and Multiplex Plan
      Inventory system of entire Long Lines transmission network. Computer runoff of all circuits available and those assigned displayed end-to-end.
   d. Complete INTS site listings for Data Base 1.
   e. Military Service/Circuit Status Report
      Complete computerization of all military service/circuits requests against available facilities.

DIRECTORATE OF NETWORK CONTROL

ORGANIZATION

As presently structured the DNC iscomprised of two major divisions each with three departments.

A. OPERATIONAL DIVISION

1. Communications Control Center (CCC)
2. Systems Commissioning Department (SCD)
3. Circuit Control Department (CCD)(Formerly CLB)

B. STAFF SERVICES DIVISION

1. Network Planning Department (NPD)
2. Computer Services Department (CSD)
3. Administrative Services Department (ASD)

The major functions of each department are described below:

1. Communications Control Center

The major responsibility of this department is to operate and maintain the technical means to detect and promptly report to the responsible organization any interruption or degradation of service on any long distance system. This includes the operation of a system-wide supervisory system to monitor the entire long lines network, record system reliability, monitor the M&O organization, direct system restoral on major outages and program scheduled outages required for system maintenance and modification.

2. Systems Commissioning Department

As a task, site, STD switch or any other portion of the long lines network becomes operational, this department prepares plans to put the facilities into actual service in accordance with the applicable circuit orders and coordinates all elements to initiate the service. Where required,because of areas not covered by any contract, SCD will actually plan and install equipment required to complete end-to-end service. A small but well trained installation group is maintained, prepared to go to any site as required.

3. Circuit Control Department

This department receives the initial service request from all prospective users, evaluates the request in the light of available facilities and monitors the request through until service is actually established. Should facilities not be currently

available and additional equipment required beyond the existing contracts CCD routes the service request to the appropriate PMO directorate for engineering, costing and budgetting. Once the facilities are provided by Contract Change Order or other means, CCD designs the transmission, prepares and publishes the circuit order and maintains complete facility records.

4. NETWORK PLANNING DEPARTMENT (NPD)

The responsibilities of this department are many and varied but generally may be grouped as follows:

a. To plan and direct Long Lines network integration with special emphasis on the interconnection and utilization of the various systems now existing, under construction or planned.

b. To carry out adaptive planning of existing facilities or plan additional facilities as required to expand the long distance network to meet public demand.

c. To accumulate and analyze traffic flow data to ensure efficient and economic loading of available facilities and to provide the basis for efficient and timely planning for the expansion of network facilities to meet future traffic demands. This includes both short and long range planning.

d. To make specific recommendations to the Ministry for the reconfiguration of existing facilities or the timely expansion of future facilities to meet the country's needs.

5. COMPUTER SERVICES DEPARTMENT (CSD).

This department is responsible for the development and maintenance of all electronic data processing services to support all other DNC departments. Assembles and maintains the complete Iranian long lines network data base for computerization of the various programs. Writes programs and develops usable and efficient computer output designed around Control Data Computer facility (CDC-6400) at Arya Mehr University. Program encompasses full computer capability from preparing runoffs to computer time sharing which in the future is expected to make use of "in house" terminal for accessing the data base.

6. ADMINISTRATIVE SERVICES DEPARTMENT (ASD).

This department supervises all clerical and administrative Iranian personnel and provides full support to all DNC departments.

DIRECTORATE OF NETWORK CONTROL

SUMMARY

The foregoing discussion clearly delineates the DNC's responsibility under its' Ministerial authorization in Iran's current effort to enter the world of modern communications. It might be described as the "operational expediter"; the agency responsible for bringing together the multitude of elements necessary to place in service the newly commissioned systems and direct the implementation of service thereon.

BUT THE DNC MUST ACCOMPLISH MORE THAN THIS. It's authorized and functional responsibilities require that the DNC become, at least for the present, the central operational control agency in the rapidly changing PTT/ITC structure to assimilate the new long lines network. The DNC must do this simply because there currently exists either in PTT or ITC no other agency which has developed the expertise in these areas required to implement the new network. Very logically the name and structure of the DNC may change and very probably the DNC will be fully integrated into the developing ITC organization in the not too distant future. This is as it should be. BUT THE FUNCTIONS AND RESPONSIBILITIES OF THE DNC MUST CONTINUE AND BE MADE A PERMANENT PART OF WHATEVER FORM THE PERMANENT LONG LINES OPERATING AGENCY MAY TAKE.

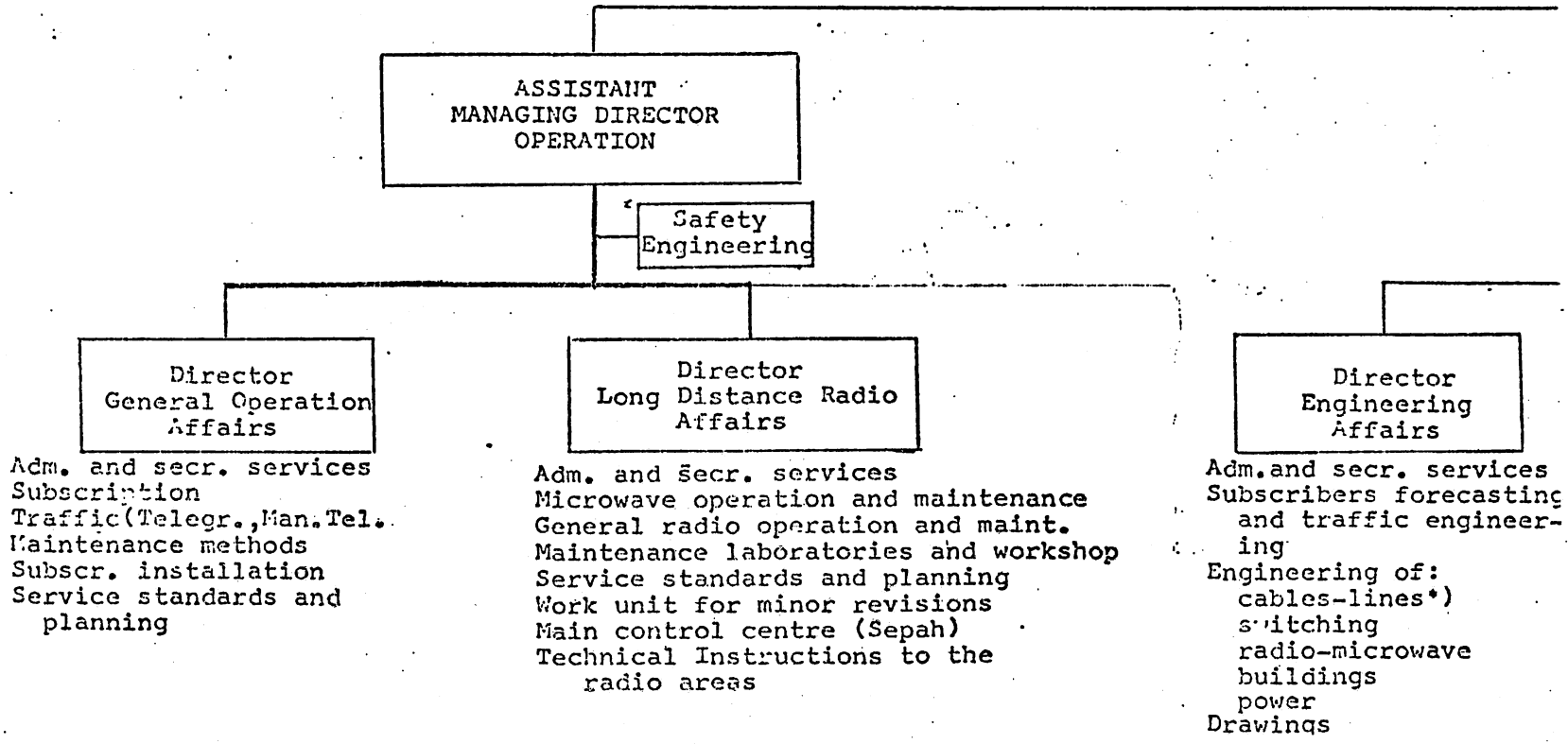
To develop its capabilities the DNC has gathered together an outstanding body of expertise both expatriate and Iranian. These people are highly trained with much experience in telephone operating administrations and entirely capable of, not building, but operating Iran's long distance system. That is the basic mission of the DNC. This group must be allowed to continue the development of the vital CENTRALIZED CONTROL philosphy without which no complex telecommunications system can operate successfully. Iran has not here-to-fore had this. To be successful the DNC requires the full support, coordination and cooperation of all the existing PTT/ITC long lines agencies. Unfortunately the DNC, so far, has not been entirely successful in gaining this support.

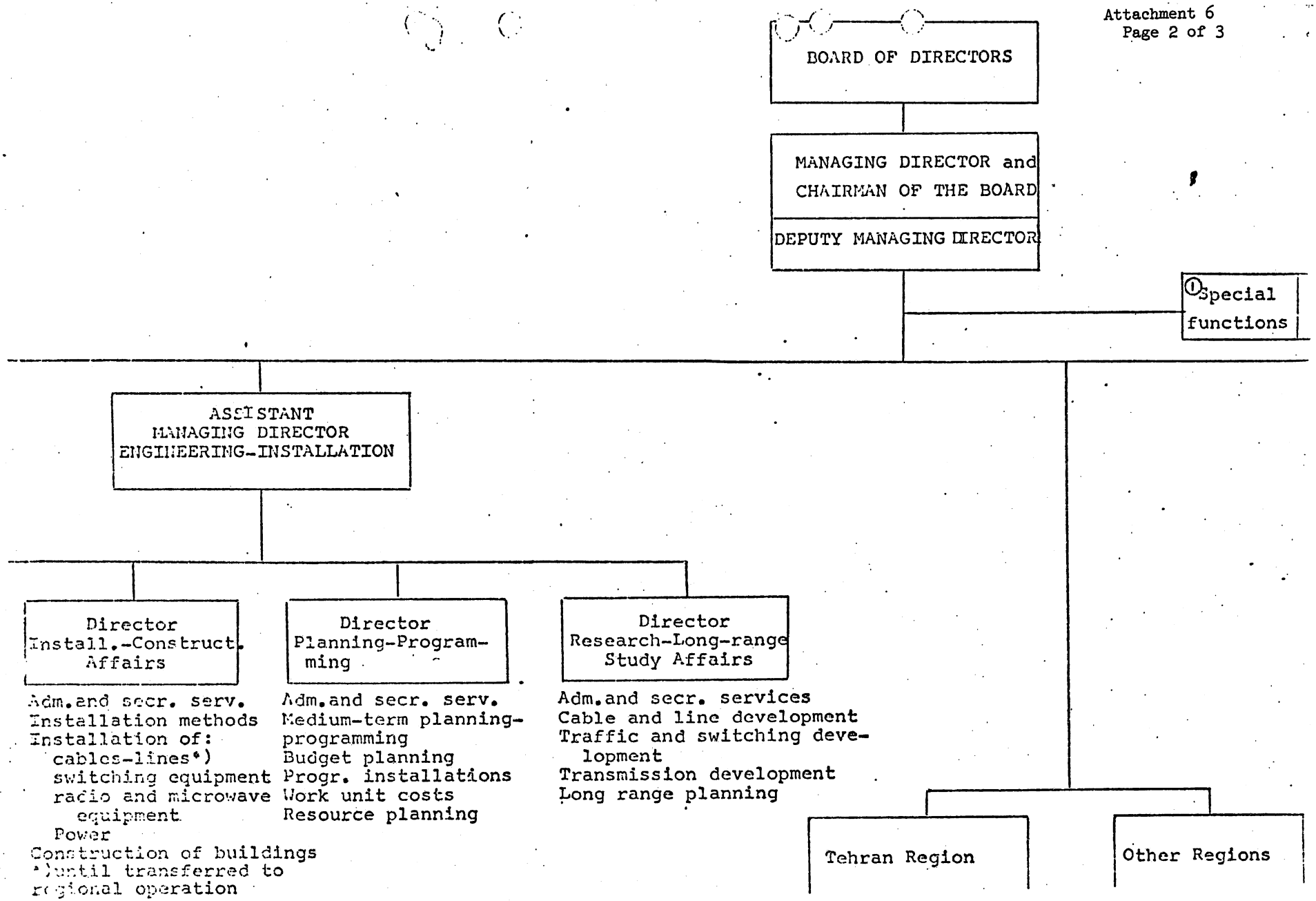
The DNC is the nucleus of this CENTRALIZED CONTROL which must be developed and become a permanent part of Iran's long distance system. Only in this way will the complex network be successful in continuing to give Iran high quality long distance service sufficient to justify the huge investment being made.

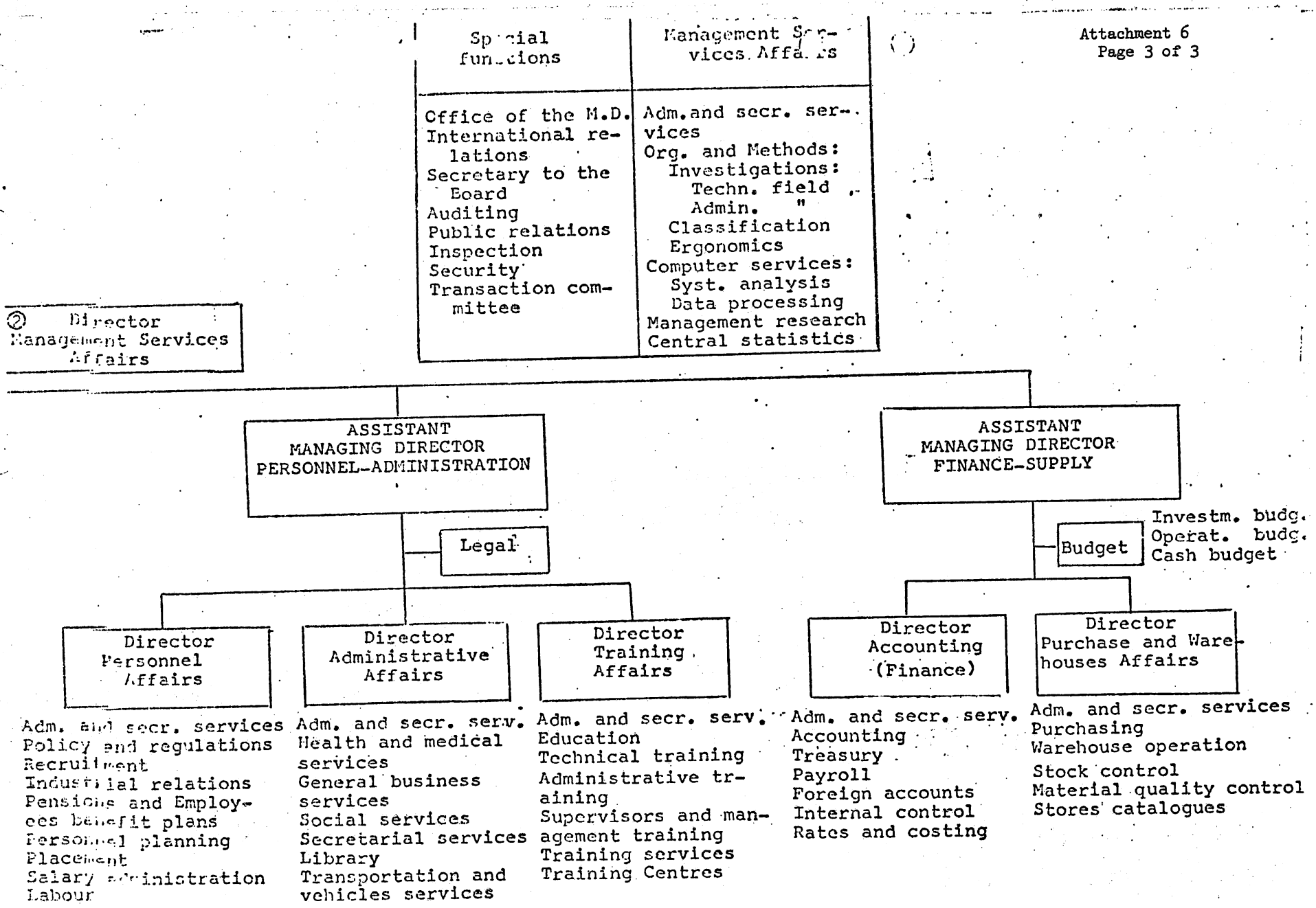
SUGGESTED TOP ORGANIZATION CHART

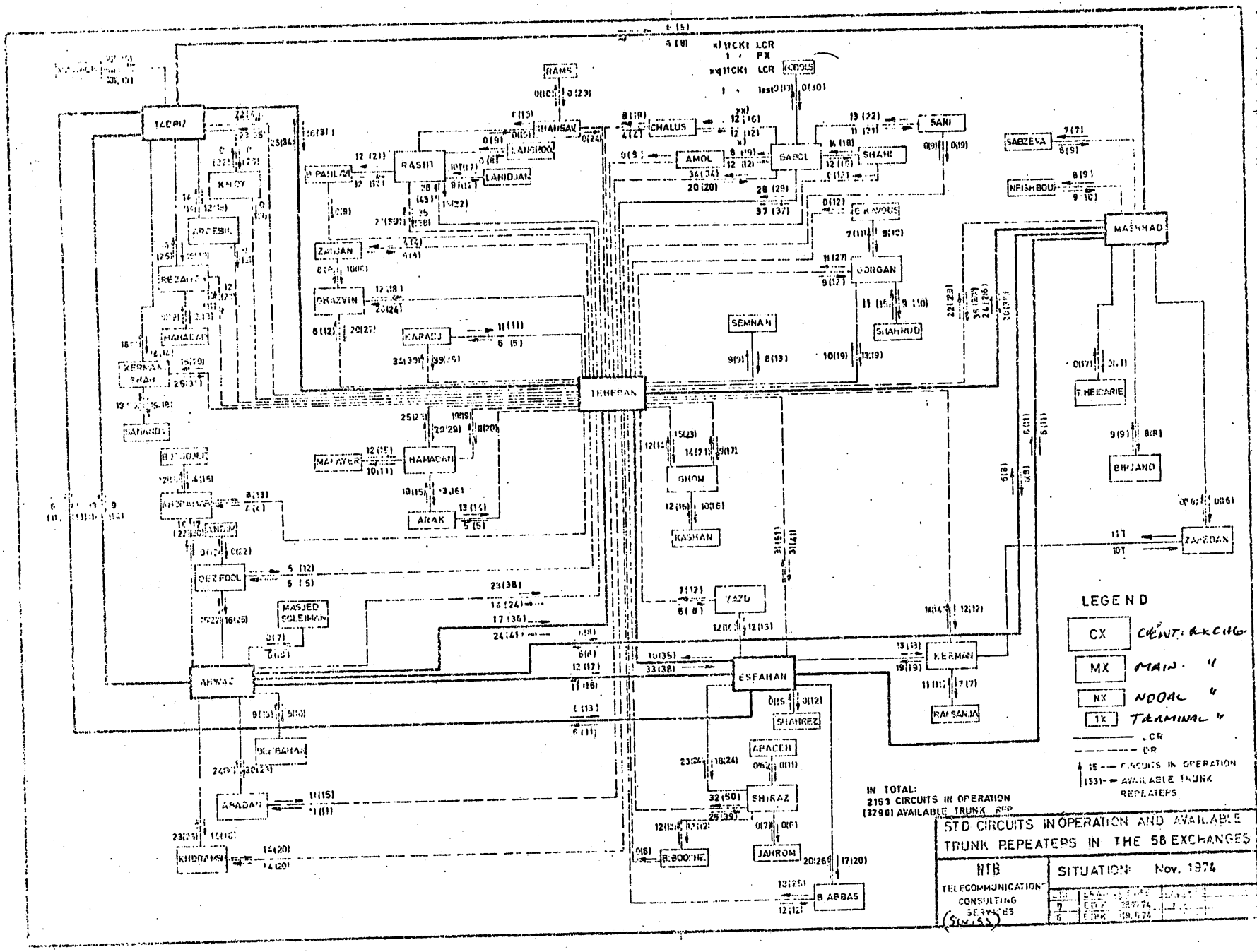
HEADQUARTERS

THE TELECOMMUNICATION COMPANY OF IRAN




BOARD OF DIRECTORS
MANAGING DIRECTOR and CHAIRMAN OF THE BOARD
DEPUTY MANAGING DIRECTOR
① Special functions
ASSISTANT MANAGING DIRECTOR ENGINEERING-INSTALLATION
Director Install.-Construct. Affairs
Director Planning-Programming
Director Research-Long-range Study Affairs
Adm. and secr. serv.
Installation methods
Installation of:
cables-lines*)
switching equipment
radio and microwave equipment
Power
Construction of buildings
*) until transferred to regional operation
Adm. and secr. serv.
Medium-term planning-programming
Budget planning
Progr. installations
Work unit costs
Resource planning
Adm. and secr. services
Cable and line development
Traffic and switching development
Transmission development
Long range planning
Tehran Region
Other Regions


Special functions
Management Services Affairs
Office of the M.D.
International relations
Secretary to the Board
Auditing
Public relations
Inspection
Security
Transaction committee
Adm. and secr. services
Org. and Methods:
Investigations:
Techn. field
Admin. "
Classification
Ergonomics
Computer services:
Syst. analysis
Data processing
Management research
Central statistics
Director Management Services Affairs
ASSISTANT MANAGING DIRECTOR PERSONNEL-ADMINISTRATION
ASSISTANT MANAGING DIRECTOR FINANCE-SUPPLY
Legal
Budget
Investm. budg.
Operat. budg.
Cash budget
Director Personnel Affairs
Director Administrative Affairs
Director Training Affairs
Director Accounting (Finance)
Director Purchase and Warehouses Affairs
Adm. and secr. services
Policy and regulations
Recruitment
Industrial relations
Pensions and Employees benefit plans
Personnel planning
Placement
Salary administration
Labour
Adm. and secr. serv.
Health and medical services
General business services
Social services
Secretarial services
Library
Transportation and vehicles services
Adm. and secr. serv.
Education
Technical training
Administrative training
Supervisors and management training
Training services
Training Centres
Adm. and secr. serv.
Accounting
Treasury
Payroll
Foreign accounts
Internal control
Rates and costing
Adm. and secr. services
Purchasing
Warehouse operation
Stock control
Material quality control
Stores catalogues



Attachment 7

ATTACHMENT 8

۱۳۵ ..... تاریخ

..... شماره

..... پیوست

June, 1974

شرکت مخابرات ایران

2M56 PROGRAM POSITION PAPER NO. 4

SUBJECT: DIRECTORATE OF SYSTEM ENGINEERING - DISCUSSION OF PROPOSED GROUP FUNCTIONS AND RESPONSIBILITIES.

NOTE: Reference should be made to the unnumbered first-draft "TCI Organization for Control of 2M56 Program", dated 19th June, 1974, which for convenience should now be marked as Position Paper No. 3.

TRAFFIC ESTIMATING GROUP

1.1 Introduction; Basic Problems

Traffic estimating is not only of the highest importance; it also shares, with Network Design, the highest priority within the overall work plan which is proposed.

The work has two main aspects: circulation of traffic within one exchange; and circulation of traffic between different exchanges. In principle the investigation of multi-exchange areas, notably Tehran, has more in common with STD studies than it does with the analysis of problems that arise within a single local exchange.

The progress of the work is complicated by the fact that TCI's network is grossly overloaded. The overload arises from:

a) Provision of insufficient common-user plant - exchange, junction cable, transmission equipment;

b) Imperfect distribution of the common-user plant that was provided;

c) Unavailability of some installed common-user plant, due to a backlog of uncleared equipment faults;

d) The fact that, often due to plant unavailability, an individual subscriber may have less exchange lines than he needs, and attempts to overload the line or lines that he does have.

The overall effect of these factors is that traffic measurements may be almost valueless, because much of the common-user plant is congested by a large volume of attempted calls, most of which will in fact be unsuccessful at some stage or other of their connection.

1.2 Recommended Approach

In the circumstances the only approach which may be expected to yield early and meaningful results is reversion to the fundamental methods which are commonly employed when a network is first established. Thus:

a) It should be assumed that subscriber and PBX trunk calling rates are those typical of comparable exchanges in other countries, where gross overload does not exist. (At one time Singapore or Hong Kong might have provided useful data to guide planning for Tehran, but it is not known whether this is still true).

b) It should be assumed that the exchanges would be provided with means of identifying over-used subscriber lines. Such subscribers would be given the alternative of acquiring more lines, or of having their inward service (and directory listings) discontinued (obviously, this approach would not be made unless TCI could offer additional lines).

There is an important link here with the local line planning function, which must not assume that a fully-occupied building that already has telephone service necessarily has as many cable pairs as it really needs.

c) Given an estimate of the traffic generated in an exchange, its distribution within own-exchange and to other exchanges - should be calculated by the exchange size, inter-exchange distance, and special community of interest factors; for example, as used in the original Sofrecom Master Plan for Iran.

d) When the network has been built - including resolution of the problem of overloaded subscriber lines - actual measurements should be used to verify and if necessary correct the calculation methods discussed under c) above.

e) The traffic estimating group should regard traffic matrices - inter-exchange and intra-exchange - as its end product. It should not become involved in how the traffic will be handled; this choice is proper to other groups of the Directorate, which are discussed below.

1.3 Staffing

For work covered by 1.2 a) - c) above a small group will suffice. A reasonable estimate is two "seniors" - assumed to be properly qualified and highly experienced officers, of any nationality which may be available, with the obvious preference for Iranians; and six Iranian "juniors".

By the latter term is implied any properly qualified officer, having a minimum of perhaps 2-3 years' practical experience.

It should be noted that all officers within a traffic estimating group need not have engineering qualifications: much of the statistical work may indeed be handled better by mathematicians or economists. However, the group must include a minimum, senior telecommunications engineering competence, if only to know, intuitively, when calculation results "cannot be correct".

It is not possible to estimate at the present time what traffic estimating staff would be needed to handle the processes summarized by 1.2 d) above. This will depend on the completeness and sophistication of the measurement facilities which form part of the new switching system which is selected; and on the assistance which TCI's Maintenance and Operations staff can provide in the gathering of measurement data. It can however be said with confidence that after the initial study, traffic data - estimated or measured - will be stored and analyzed by computer. By normal experience this will increase the volume, detail and accuracy of the traffic estimates, rather than reducing the requirement for staff.

Many TCI activities will require computer support of this kind, and the likely magnitude of the computer facility can be assessed only when all, or most of the likely needs have been quantified.

(2) NETWORK DESIGN GROUP

2.1 Introduction; Basic Problems:

The Network Design group has to decide how the traffic volumes calculated by Traffic Estimating will in fact be connected. Traditionally, it considers only inter-exchange traffic: within-exchange problems are handled by the Switching Group. (NOTE: this division of responsibilities might not be valid if major problems arise, affecting the operation of two equipment types within a single exchange).

The end-product of the Network Design Group is a dimensioned routing plan. However this plan must consider constraints imposed by the national numbering plan, attenuation plan and charging plan; by the functional limitations of the exchange types which are or will be in service; by the geographical positions of the points to be served; and by the geographical layout and functional limitations of the transmission systems which link the exchanges.

A very important issue is the philosophy which is chosen for alternative routing. All the same issues must be considered as are applicable for simple direct routing. As a complication, some transmission systems which are suitable for direct routes will not be suitable for inclusion in an alternately-routed connection chain.

Without doubt the main problem which the Network design group must face is imposed by the relatively "unintelligent" nature of the EMD switching equipment which is now general within TCI's network. This ties call routing rather tightly to the numbering plan. The consequences are most obvious in the Tehran multi-exchange area, in which nearly every exchange is mesh-connected to every other exchange.

To a lesser extent, the STD network suffers from non-provision of sophisticated alternate routing facilities in the EMD STD switches.

2.2 Suggested Approach

A determining factor is that TCI's network is in a very early stage of its evolution. It would be shortsighted in the extreme to allow the functional limitations of existing plant to dominate the design of a network which within a few years will be ten times larger.

At the same time it must be realized that an EMD exchange, of the direct-control type bought by TCI, will perform satisfactorily most of the own-exchange functions that users require. Any of the most-desired new features, such as push-button "dialling" and short-code dialling can be provided in an EMD exchange by the use of new types of subscriber's apparatus, which with the aid of LSI electronics are becoming less mechanical, and so more reliable.

Thus, it is recommended that existing EMD exchanges be considered, first, as 10,000 line "local blocks", which economically and operationally can remain in service for many years to come.

It is much less certain that inter-exchange switching should continue to be handled by directly-controlled EMD, within TCI's new network.

While it is accepted that EMD's flexibility can be much improved, by the addition of - rather expensive - common controls, the preferred approach is more likely to be the introduction of new-generation "intelligent" switches at all points where EMD interfaces the national long distance network, or a multi-exch local network. These new-generation switches would take over all long distance, tandem-local and - probably - special services.

It is easy to make a broad and sweeping proposal of this kind, but much harder t develop a detailed and phased plan which permits transition from the present configuration to the new one. In judging whether the concept is worthwhile it should be remembered that only a small proportion of the existing EMD switching equipment would be affected; and some of that could be re-used within the "local blocks".

Whatever new network concept is adopted, it is certain that a major part of the Network Design Group's workload will be representated by detailed plans for the commissioning of individual new exchanges.

2.3 Staffing

Unlike the Traffic Estimating Group, the Network Design Group may expect considerable assistance from the selected supplier(s) of the new generation of switching equipment. Support will also be available from the EMD-system design consultant (NTB); and from the consultant charged with selection of a ne switching system (Sofrecom). Other useful inputs will be available from Ministry of PTT, PMO, as manager of the INTS long distance system; and from PTT's Directorate of Network Control - which in fact contains activities which might be thought more appropriate to TCI's Network Design Group.

Probably a large part of Network Design's work load will consist of collecting and reconciling these often-conflicting data and opinions.

It is difficult to recommend firmly as to staffing, until the nature of the new switching equipment - and its supplier = become known.

Approximately, the initial staff of the Network Design Group might be:

1 Senior + 2 Juniors ...fundamental planning

2 Seniors+ 4 Juniors ...(2 teams): cutover plans for new plant.

(3) SWITCHING GROUP

3.1 Introduction; Basic Problems

The role of the Switching Group will be to select a most-suitable new generation of exchange equipment for TCI; to plan its integration with the existing switching facilities and inter-exchange network; and to call up for each new exchange the facilities and equipment quantities that are needed. As for Network Design, support may be expected from the equipment suppliers and from various consultants, obviously and notably Sofrecom.

The main likely problems are:

a) Detailed planning for integration of the new type(s) of switching equipment with the existing EMD system - which is itself to be expanded.

Under the discussion of the Network Design group it was suggested that the "cleanest" solution might be to retain EMD equipment only as local switching blocks. This concept must of course be tested for operational and economic viability. Even if it is accepted it will be a major task to prepare a phased and detailed plan for cutover from the old arrangement to the new. Network Design would make these plans for the inter-exchange connections, and would provide functional guidelines for within-exchange works, but it would be for the Switching group to arrange provision, installation and cutover of the necessary equipment within each exchange (EMD or "new").

b) Maintenance difficulties arising from the fundamental differences between direct-control EMD and a new switching system - assumed for the purpose of argument to be common-control, employing some form of crosspoint connection.

It is outside the suggested scope of the 2M56 Program to establish a new maintenance organization. However, the 2M56 construction program should attempt to minimize obvious likely difficulties. It might be desirable for this reason alone to seek a solution in which all EMD equipment is concentrated in certain exchanges. These might have no new-generation equipment at all; or only a new-generation switchblock reserved for out-of-own-exchange traffic - see section 2.2 above. It will be recalled that a likely functional problem is that EMD uses a 60V dc power supply, whereas a new system is much more likely to employ 48V.

c) The required very short delivery period for new-generation switching equipment.

It may be that no bidder will be able to offer quantities and delivery dates for preferred equipment which agree with TCI's construction program. If this occurs, the choice will be:

i) To lengthen the program;

ii) To buy from more than one supplier; and/or

iii) To accept that the first deliveries may be of an older, less than ideal, equipment type.

It is difficult to comment further until the bids are received. Some compromise may have to be considered: say, crossbar equipped initially with an electromechanical or wired-logic electronic control, which could be converted later to stored program control. The implicit risk of loss of standardization will make this decision a difficult one.

d) The extensive rural network which is now projected is a new requirement, and was not covered in TCI's invitation to tender for new exchanges. This network will typically require a very large number of small switches, each of 10-100 subscriber capacity. The rural subscribers should, so far as possible, have the same facilities as are available in TCI's large exchanges.

There are three likely approaches:

i) To regard the rural switches as line concentrators. In this case they can use the parent exchange's "intelligence" - but it is likely that all service will be interrupted if the parent/rural junctions fail.

ii) To provide the rural exchange with its own "intelligence". This allows it to work when the junctions fail; but it may be uneconomical to provide the full subscriber facility schedule of a large exchange.

iii) Some compromise between (i) and (ii).

It is not practicable to discuss this important choice until more is known of the likely exchange equipment supplier and his products. It must be remembered however that he must be able to offer some equipment of this type - to interface readily with rural equipment supplied by others.

e) Stored Program Control (SPC). For many engineers a subjective factor exists: that to be up-to-date one should have a computer somewhere.

TCI must satisfy itself that its new network requires the flexibility which SPC can offer. To permit this decision the revenue and service benefits of SPC must be evaluated quantitatively. This exercise will require very careful stud and considerable professional judgment.

f) Local line limit. With TCI's network in a very early stage of its development, it may be economical to exploit the longer local line limit of newer types of switching equipment: to forget the existing junction network, and to have fewer, larger exchanges serving bigger areas. Alternatively, the old service areas, - if they exist - may be retained, but smaller-gauge subscriber cables ma be used. There are so many possible permutations that computer-optimization of exchange service areas will probably be required.

3.2 Suggested Approach

The basic principle is that the telephone exchanges should be selected to meet the needs of the complete network; the network should not be forced into a configuration which agrees with avoidable functional limitations of the telephone exchanges.

For ease of development and maintenance the network should be as simple as possible. This suggests that where possible a building should contain as few equipment types as possible. Similarly, it would be better not to retain EMD-STD dial pulse signalling once R1/R2 long distance signalling is introduced on a large scale.

An initial but rather strong impression is that numbering, signalling and toll ticketing problems associated with the Tehran multi-exchange area, and with the new rural network, will favour the large-scale introduction of quite "intelligent" common control exchanges. Whether this intelligence requirement justifies SPC is another matter.

Certainly, future local line planning should exploit the longer subscriber loops which modern exchanges permit (typically, 1800 ohms including telephone set). In some cases this will imply larger exchange areas, and in many cases it will allow shorter subscriber lines to be carried by smaller gauge cables.

In the event that available equipment delivery dates require more than one type of new-generation exchange, it would be desirable if there were standardization within one geographical area. This is much more convenient for the maintenance staff than an arrangement by which - say - all units over 3000 lines capacity are provided manufacturer A, and all units under this capacity by manufacturer B. However, this is an issue in which TCI's policy is likely to be determined by what the suppliers can in fact provide by the unusually-early dates required.

3.3 Staffing

It is assumed that the work of the Switching group will be directed, or at least co-ordinated, by the Sofrecom team, as a logical follow-up of their earlier studies.

Not counting the support which will be available from the selected equipment supplier(s), it is estimated that a team of three Seniors and 6 Juniors will be required.

(4) WIRE AND CABLE PLANNING

4.1 Introduction; Basic Problems

This work is perhaps the most complex which the Directorate of System Engineering must handle. The complicating factors include:

a) TCI does not hold complete, accurate and up-to-date records of what duct and cable plant now exists; which ducts are in use, etc.

b) Some cable pairs are unusable, and others have substandard transmission performance.

c) Some manholes are now so full that it is almost impossible to work in them.

d) The existing "drop wiring" - the single-pair wiring from the cable termination box to the subscriber's premises - is in such bad condition that one estimate blames it for up to 90% of the total failures reported of a single telephone.

e) With Iran's very rapid economic growth, it is very difficult to forecast the geographical distribution of new subscribers. Municipalities may know what areas of their city are zoned for what usage, but they do not know when, or on what scale, the development will occur. On-the-spot surveys are of limited value. They do provide guidance as to what percentage of a city's telephones will be in any given area, but they do not provide a clear indication of total demand (because a cross-questioned individual may have said in good faith that he does not want a telephone: but with rapidly increasing disposable income may discover in a year or two - to his own surprise - that he does in fact need one).

The special problem in Tehran is that high-rise construction must be expected in the city centre: this could increase the requirement in local cable pairs per hectare by a factor of 10-100.

f) As discussed under (3) above, there will probably be a new basis for local line planning, arising from the increased subscriber loop limit of new types of telephone exchange: this may affect exchange service areas, and so the layout of local cable plant.

g) Junction circuits may in future, be provided by PCM carrier-on-cable or by microwave radio, rather than by physical cable pairs. Determination of the economic crossover points is complicated by the fact that many existing junction cables will have to be overhauled before one cable could carry several PCM systems.

.2 Suggested Approach

Most of this work will probably have to be subcontracted. Subject to discussion it is recommended that:

a) A contract be placed immediately with a reputable international contractor to survey existing ducts, manholes, cables and drop wiring. On receipt and approval of his report the contractor should then undertake:

- complete documentation of line plant
- complete rehabilitation of drop wiring. Very probably this implies complete replacement
- overhaul of substandard junction cables, to fit them for PCM working
- gas pressurization of primary distribution cables, from MDF to distribution boxe
- civil works necessary to provide tolerable working conditions in overcrowded manholes.

b) An urgent study be made, to locate new cable distribution boxes (typically, of 200-1000 pair capacity). This should be followed by a contract to lay, joint and terminate new primary cables to feed these distribution boxes. The new cables would be gas-pressurized.

In some cases provision of the new primary cables may require extension of the exchange MDF.

c) At least temporarily the secondary distribution cables, from distribution boxes to terminal boxes, should be aerial (unless ducts exist; or the development pattern of the area is so clear that new ducts can be planned and laid by the required ready-for-service dates).

d) Based on the above, a bulk order should be placed as soon as possible for cables, distribution boxes, terminal boxes, drop wire, MDF verticals and all associated hardware.

e) TCI should review its staff resources to determine if it could install and document itself the secondary cables and drop wiring which correspond to the new primary cables proposed under (b).

4.3 Staffing

By the approach suggested much of the Directorate of System Engineering's workload would be handled by contractors.

The proposed staff is two Seniors and twelve juniors, all responsible for different aspects of co-ordination. The relatively large number of Juniors corresponds to the need to monitor secondary cable planning, installation and documentation.

(5) TRANSMISSION GROUP

5.1 Introduction; Basic Problems

In one sense the transmission group has the easiest task of all groups recommended for inclusion in the Directorate of System Engineering. This is because the INTS microwave radio network is at last approaching completion, and this will provide broad-band communication between most of the larger locations which TCI will wish to serve.

It is true that INTS multiplex channel-ends have not been provided with any idea of serving a 2-million subscriber telephone system; but in many cases the extra channels can be provided by the simple plugging-in of additional modules in already existing carrier racks.

The main problems of the Transmission group will be:

a) Administrative confusion. This could arise because PMO and DNC, who have most information about the long distance facilities being constructed, are part of PTT and not of TCI.

b) The fact that rapidly-escalating Military circuit requirements may fully-load even INTS' considerable baseband capacity.

c) The fact that the traffic capacity of INTS depends to some extent on the nature of the long distance switching equipment: notably, on whether the switches are full-availability; and on the ability of the system to select alternate routes.

d) The possibility that though an INTS radio route may pass near a place which TCI wishes to serve, INTS may not have traffic drop facilities at the station where TCI would like to connect (for example, the INTS station may be a "through repeater".)

e) The likelihood that TCI's new rural network may require low-capacity transmissi systems to places which cannot be served by a short and simple connection from INTS.

In this respect, it is relevant that poor radio frequency planning and regulatio has created a severe radio interference problem in Iran, especially in the vhf band, which is most economical for rural services.

5.2 Suggest Approach

a) It is first necessary to mark on a map all the locations which TCI wishes to serve. The INTS system should be marked on the same map, to give a first idea of which locations should have relatively easy access to INTS, and which will r

b) The traffic requirements must be calculated for each planned traffic point. In this respect it must be remembered that multiplying the number of telephones in Iran by four will not increase the total long distance traffic by four. It i common experience that the first 2-5 telephones per 100 population carry up to 85% of the potential long distance traffic; residential lines make few long distance calls.

c) Comparative costs should be determined for the rural and semi-rural "tail" connections into INTS, the most likely transmission media being:

i) Line carrier; probably of the "stackable" kind. This has considerable attractions when there are many traffic drop points situated close, one t another. It also facilitates the giving of service to important remote subscribers. If possible the equipment should be obtained with a 60-108 access point, thus permitting simple group patches into the main-route radio system. (However, even if this is done, it must be expected that carrier frequency-translation equipment will represent a considerable percentage of the total cost of teeing onto a major microwave route).

ii) Vhf radio. There are two useful configurations:

- the usual 12-24-48 channel point-to-point route;

- multi-access single-channel, using "broadcast" transmitter-receivers, usually situated at microwave repeater stations. These systems can provide wide-area mobile connection into the public telephone service. They can also feed very isolated low-traffic points such as highway emergency telephones and farms - though primary power supply at the remote stations may represent a difficulty. Typically these single-ch systems connect into the microwave radio sub-baseband, not into the much less accessible traffic baseband.

iii) Junction cable, buried or aerial. This is likely to be economical onl over very short distances.

iv) Domestic satellite. Comment would be premature.

d) A broad-brush agreement is needed with the Military, to limit their use of a fair proportion of its installed capacity - say, 50% - until INTS capacit is increased.

Probably there is a case now for adding more rf channels to some microwave routes.

e) An agreement should be reached as to the respective planning roles of PMD, TCI. At first sight all this work should be done within TCI, but detailed discussions are needed before a policy can be recommended.

f) In any event, a high priority must apply to preparation of a first-draft nex national multiplex plan, and to deriving from this a bulk order for transmission equipment. Much of this will come from the GNPS companies GTE, NEC and Siemens, to expand existing INTS mutliplex terminals of their manufacture. Probably, the light-route equipment required for rural servic could be the subject of a more open invitation to tender.

g) PCM equipment for use in multi-exchange areas is an entirely different prob Its competitors are physical cable and microwave radio - probably working at 11 GHz, to reduce frequency planning problems. The nature and magnitude of this junction problem will become apparent only when first-draft inter-ex traffic matrices are available.

5.3 Staffing

The approximate requirement is three Seniors and three juniors, the number bein limited by the physical size of the national multiplex plan diagram. However, does not include design of transmission systems for rural services, as the magnitude of the problem is not yet known.

(6) TECHNICAL LIAISON GROUP

By the nature of the Control Organization proposed for the 2M56 Program - see Position Paper No.3 - other Directorates will need support from the Directorate of System Engineering, in order to perfrom their functions. As examples, Finance will need Budgetary costs for capital equipment and services; Contract Administration will need technical support in negotiating contracts for equipment and services; Personnel will need help in writing job descriptions for TCI staff; Civil Engineering will need systems engineering guidance as to the functional requirements of the buildings and duct routes they design.

To some extent all of the Systems Engineering groups discussed in earlier sections of the present paper will give liaison assistance of this kind. However, it seems desirable to form a special group, whose members would have an overall knowledge of what is in progress and what is planned within the 2M56 Program. These officers would handle the bulk of 2M56 inter-Directorate liaison; liaison with non-2M56 activities within TCI; and liaison with possibly-affected outside agencies, for example Military, NIRTV, NIOC and - not least - PTT. They would call up specialist support from other Systems Engineering groups, as required.

The recommended staff is two Seniors and four Juniors, all of them "generalists" rather than specialists. For language reasons, one of the Seniors must be Iranian. In this group management experience is very desirable.

(7) TECHNICAL INFORMATION CENTRE

The principle: Knowledge is Power - is well-understood in Iran.

In principle the 2M56 Program will need every available shred of information regarding the existing telecommunications facilities and plans of all organizations within the country, charged with the manufacture, installation and use of telecommunications plan The list is long, ranging from ITMC, Siemens and SEL to Micco, PMO and DNC.

There is a general tendency to guard this information, and not to disclose it to others. This happens even within an organization - say, PTT - where one department may be reluctant to reveal all its data and ideas to another.

As a further complication, the documents concerned may be written in Farsi, English, German, French - sometimes in Japanese and Hangarian - or in any combination of these languages.

The purpose of the technical information centre is to bring all these data - or, more likely, copies of all these data - under one roof. The centre would also provide translations (or summary translations) when needed, and would issue to all interested parties an index of what data are available.

For this to be useful a full index is needed; for example, the words "cable diagram" may mean many different things, according to context. Probably, the sheer volume of paper will require microfilm storage, especially for the less-needed documents.

The staff proposed is one or two Seniors and four Juniors. Clearly, they will need to know the principles of technical data classification and storage; but a main requirement is the "bloodhound" ability to track down and secure copies of all relevant documents.

(8) DRAWING OFFICE

The chart for the 2M56 Control Organization shows drawing office and document reproduction as being controlled by the Manager of Support Services. This is because many Directorates need these services, and a large drawing office can be more productive than several small ones.

As a reservation, it is intended that when the drawing office starts a job for the Directorate of System Engineering, the draftsman will be controlled directly - for the period of the job - by the engineer who requires the drawing.

It is estimated that Systems Engineering will provide a full-time load for three bilingual draftsmen, with peak loads in excess of that value. (The assumption is that most of the really time-consuming drafting, for example building drawings and underground cable maps, will be handled by the contractors appointed for these capital works).

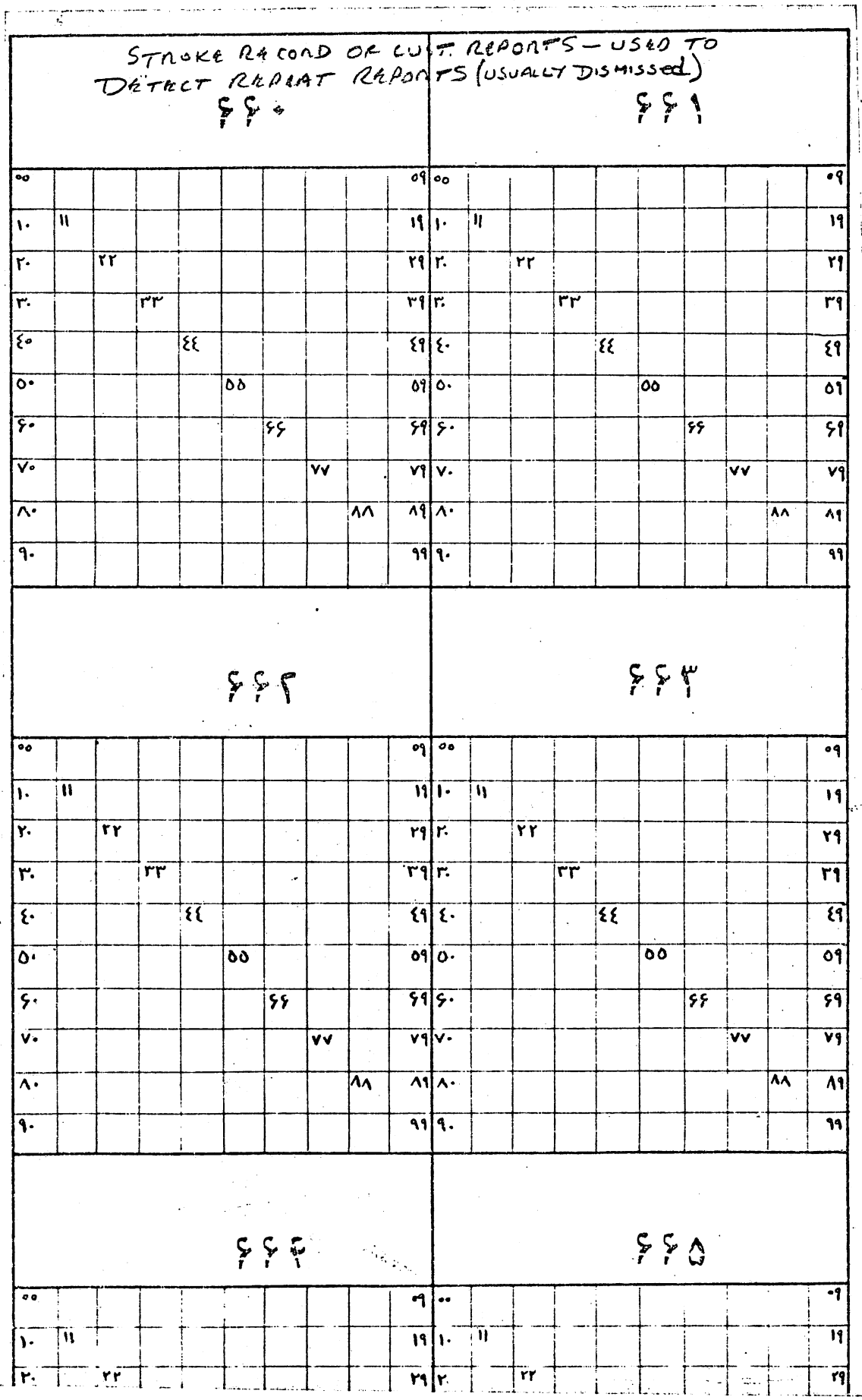
(9) SUMMARY OF STAFF REQUIREMENTS FOR DIRECTORATE OF SYSTEM ENGINEERING

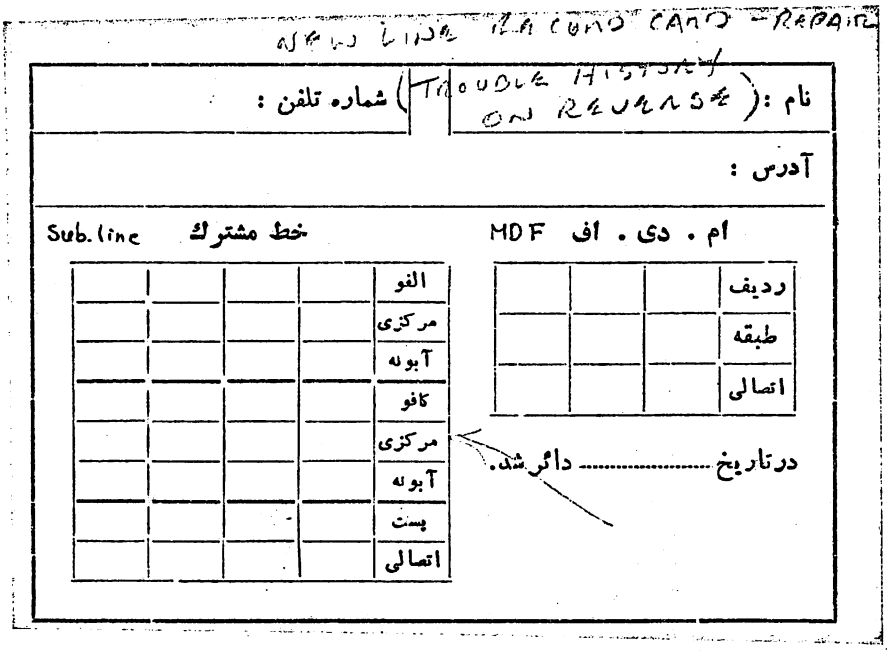
NOTE: Supporting staff such as secretaries, drivers are not included at this stage.

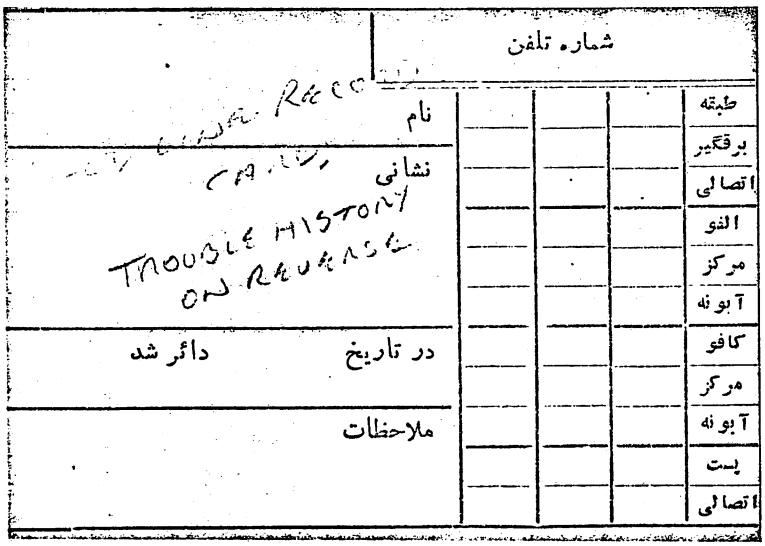
	Seniors	Juniors
Director	1	
Traffic Estimating	2	6
Network Design	3	6
Switching	3	6
Wire & Cable	2	12
Transmission	3	3
Technical Liaison	2	4
Technical Information Centre	2	4
TOTALS:	18	41

NOTE: Not including staff for design of rural system, which need cannot be quantified at present.

STROKE RECORD OF CUT REPORTS — USED TO DETECT REPEAT REPORTS (USUALLY DISMISSED)




NEW LINE IN CUND CARD - REPAIR
نام : (TROUBLE HISTORY ON RECORDS)
شماره تلفن :
آدرس :
ام . دی . اف MDF
ردیف
طبقه
اتصالی
خط مشترک Sub. line
الفو
مرکزی
آبونه
کافو
مرکزی
آبونه
پست
اتصالی
در تاریخ ..... دائر شد.


شماره تلفن
نام
نشانی
TROUBLE HISTORY
ON RECORDS
در تاریخ
دائر شد
ملاحظات
طبقه
برقگیر
اتصالی
الفو
مرکز
آبونه
کافو
مرکز
آبونه
پست
اتصالی

TROUBLE REPORT - REPAIR

ورقه اصلاحات خرابی

وارد

فرم ف

۱۰۴۴۳		شماره تلفن	شرکت مخابرات ایران
شماره اتصالی	صفحه برق‌گیر	طبقه	
اتصالی ك	اتصالی مرکز	تقسیم خط	
اتصالی ك	اتصالی تقسیم‌خط	شماره ك	نام
شماره اتصالی	پست		نشانی
			تاریخ خرابی
			تاریخ خرابی سیم
			نوع خرابی

مشخصات فنی خط

بعد از تعمیر			قبل از تعمیر		
مقاومت	عایقی		مقاومت	عایقی	
ب/	ب	ب	ب/آ	ب	آ

هزینه جنسی که مصرف شده	محل خرابی
	علت خرابی
	نوع ترمیم
	تاریخ ترمیم

محل امضاء کننده

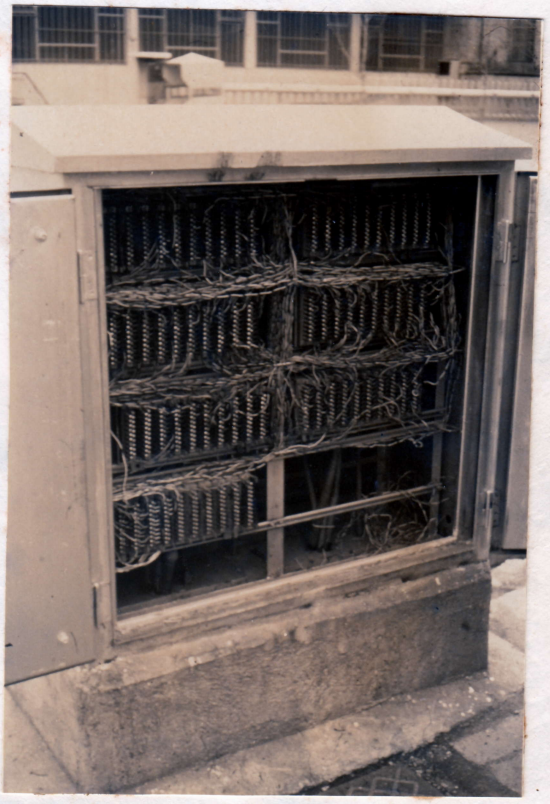
تاریخ

ماه

میزان مصرف جنسی

شماره کالا ۴۰۴۲۷ — ۴۰۰۰ دسته ۱۰۰ برگی ۵۳/۲ چاپ الکو نومیست

Attachment 10



Attachment 10

Attachment 11


TEL CAR

Attachment 13

شرکت سهامی تلفن ایران

FRAME ORDER - 7 LINES

Forme E

سیم بندی دستگاه توزیع

شماره تلفن	سابق			فعلی			ملاحظات
	طبقه	برقگیر	اتصالی	طبقه	برقگیر	اتصالی	
1							
2							
3							
4							
5							
6							
7							

ثبت شد شماره لیست 617

صورت نصب

انجام شده

تاریخ

نمونه ۶۲

Net. Dep.

آدرس	نام مشترك	شماره تلفن	مرکز تلفن
شماره { تلفن رومیزی / تلفن دیواری }	خط L. V. فرم ب		شماره ترتیب
شماره پست اتصالی	در تاریخ	کمیتاطور توسط	نصب شده
شماره KV اتصالی { خروجی / ورودی }	در تاریخ	سیم کشی داخلی از دستگاه تلفن تا برقگیر مشترك توسط	نصب شده
شماره LV اتصالی { خروجی / ورودی }	در تاریخ	سیم کشی داخلی مشترك از پست تا دستگاه تلفن توسط	نصب شده
امتحان شد تاریخ : am			بوخت
دائر شد تاریخ			

ملاحظات

شماره فیش .....

۱۸ م م

IMPERIAL GOVERNMENT OF IRAN

Ministry of Posts, Telegraph & Telephone

Directorate of Network Control

CIRCUIT LAYOUT BUREAU

P O Box 12/1135 Tehran

Tel 770698

CIRCUIT ORDER

Date 4 MARCH 73 Prepared By G. H. SABOKI

Due 14 MARCH 73 Control Office TEHRAN Report Comp

THIS ORDER IS ISSUED TO ESTABLISH STD CIRCUITS BETWEEN MASHHAD AND TEHRAN. MUX WAS ESTABLISHED ON C.O. 10024.

DIST: 2-CCC) 1-NEC) 1-NTC) 1-NTB) 3-STPC) 5-DNC 1-PMO) 2-TRN) 2-MSD) 1-MSD-PMO) 1-NPD(ITC), 1-MWD(ITC)

10161

General Explanation of S[illegible] Circuit Order Form

1. "ITEM" Column: The item number is a reference number used for quick location of a particular circuit in the circuit order during discussion.

2. "CIRCUIT" Column: The number is the circuit identification number assigned by the CLB Department, based on CLB Operation Memorandum, dated 4 November 1971. The first site name is the Originating, and the second is the Terminating STD location.

3. "ACTION" Column: CLB uses the following abbreviations: ESTAB = Establish; DISC = Disconnect; CHG = Change; ADD = Additional.

4. "CHAN" Column: The Group and Channel assigned by CLB to the circuit described in the Circuit column. The assigned channel number relates to the MUX Circuit Order number which appears on the face sheet of each circuit order. The MUX Circuit Order must be refered to for proper Supergroup, Group and Channel to be assigned to the circuit.

5. "CA" Column: INTS cable tails from multiplex terminals to adjacent sites have already been assigned identities and use as follows: Cable A = VF Transmit (MOD); Cable B = VF Receive (DEMOD) Cable C = DC (E. & M., TG). CLB assigns the pairs in this column. If the same pair is used in all three cables, there is a single number in this column. If we have to use different pair numbers they will be shown as in the following examples:

$\frac{21 - 30}{6}$ Or $\frac{A - B}{C}$

(21 is MOD, 30 is DEMOD, 6 is E. & M.) (A is MOD, B is DEMOD, C is E. & M.)

7 Links system used Quaded cable with a straight count and not the A, B or C cable method therefore Transmit, Receive and Signal will always have a different cable pair number assi

INTS CDF MUX Assignments see example No. 2.

6. "NEC CDF MUX" Column: See attached example No. 1.

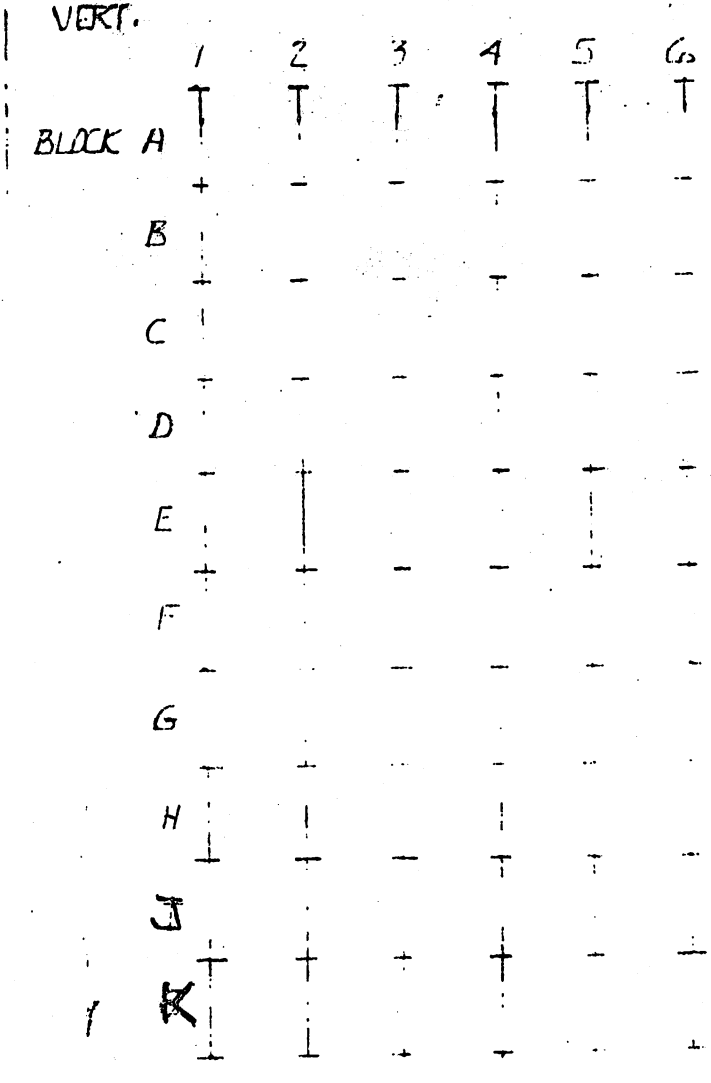
7. "TRK" Column: STD Trunk number assigned by the Siemens Company.

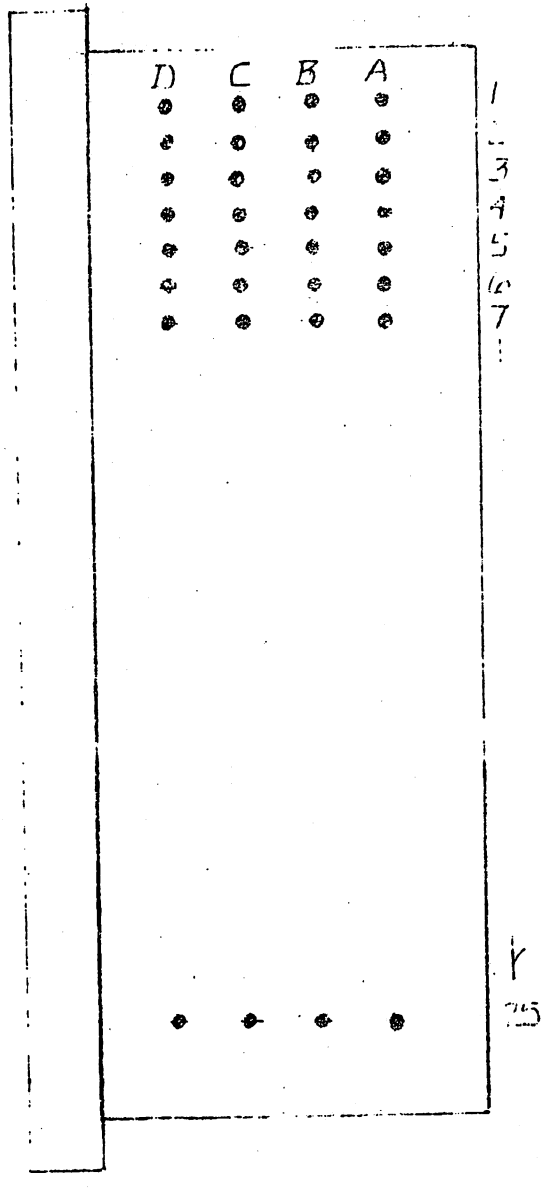
8. "TRAN" - "REC" Columns: Transmit and Receive terminal block designations assigned by Siemens. See exam No.

9. Where items are horizontally divided, the upper half is for the Originating site, the lower half is for the Terminating site.

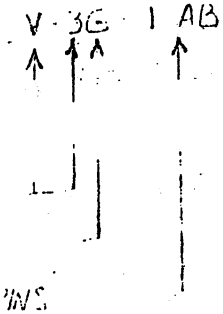
C.O. 10161

N - MUX CDF (.DF



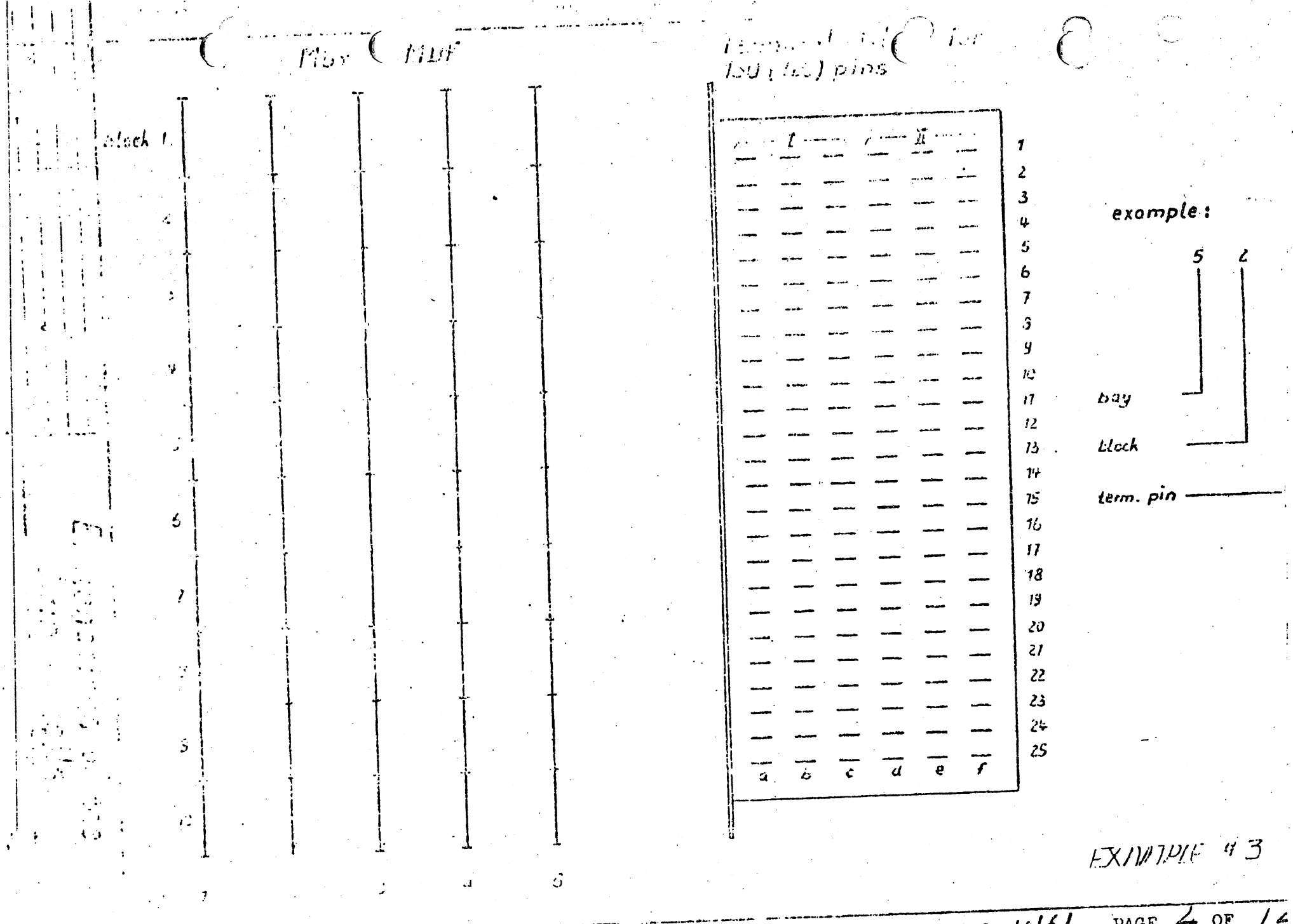


EXAMPLE.



EXAMPLE #1

C.O. 10161


Block 1
I
II
a b c d e f
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
example:
5 2
bay
block
term. pin

EXAMPLE # 3

ITEM	CIRCUIT DESIGNATION	DETAILS														
		CHAN	CA	NEC CDF MUX S	NEC CDF MUX R	NEC CDF MUX SIG	TRK	TRAN BAY	TRAN BLK	TRAN TERM	REC BAY	REC BLK	REC TERM
1	DR 001 MSD-TRN ESTAB	1R-4	4-316 / 628	V-1A 4AB	V-2A 36AB	V-3B 29AB	1	1	L	9I	1	E	9I
				H-11K 5AB	H-11K 4AB	H-11K 3AB	1	6	11	20II	6	5	20D
2	002 MSD-TRN	1R-5	5-317 / 629	V-1A 5AB	V-2A 37AB	V-3B 31AB	2	1	L	10I	1	E	10I
				H-11K 5CD	H-11K 11CD	H-11K 5CD	2	6	12	1II	6	6	1D
3	003 MSD-TRN	1R-6	6-318 / 630	V-1A 6AB	V-2A 38AB	V-3B 30AB	3	1	L	11I	1	E	11I
				V-6B 19CD	V-5B 19CD	V-4B 19DE	3	6	12	2II	6	6	2D
4	004 MSD-TRN	1R-7	7-319 / 631	V-1A 7AB	V-2A 39AB	V-3B 31AB	4	1	L	12I	1	E	12I
				V-6B 20AB	V-5B 20AB	V-4B 20AB	4	6	12	3II	6	6	3D
5	005 MSD-TRN	2R-4	15-327 / 639	V-1A 15AB	V-2A 7AB	V-3B 39AB	5	1	L	13I	1	E	13I
				V-6C 4CD	V-5C 4CD	V-4C 4DE	5	6	12	4II	6	6	4D
6	006 MSD-TRN	2R-5	16-328 / 640	V-1A 16AB	V-2A 8AB	V-3B 40AB	6	1	L	14I	1	E	14I
				V-6C 5AB	V-5C 5AB	V-4C 5AB	6	6	12	5II	6	6	5D
7	007 MSD-TRN	2R-6	17-329 / 641	V-1A 17AB	V-2A 9AB	V-3C 1AB	7	1	L	15I	1	E	15I
				V-6C 5CD	V-5C 5CD	V-4C 5DE	7	6	12	6II	6	6	6D
8	008 MSD-TRN	2R-7	18-330 / 642	V-1A 18AB	V-2A 10AB	V-3C 2AB	8	1	L	16I	1	E	16I
				V-6C 6AB	V-5C 6AB	V-4C 6AB	8	6	12	7II	6	6	7D

10161

CLB 2C

ITEM	CIRCUIT	ACTION	DETAILS													
					NEC CDF MUX			TRK	TRAN			REC		
	DR		CHAN	CA	S	R	SIG		BAY	BLK	TERM	BAY	BLK	TERM
9	009 MSD-TRN	ESTAB	3R-1	23-335 / 647	V-1A 23AB	V-2A 15AB	V-3C 7AB	9	1	L	17I	1	E	17I
					V-6G 13AB	V-5G 13AB	V-4G 13AB	9	6	12	8II	6	6	8II
10	010 MSD-TRN		3R-2	24-336 / 648	V-1A 24AB	V-2A 16AB	V-3C 8AB	10	1	L	18I	1	E	18I
					V-6G 13CD	V-5G 13CD	V-4G 13DE	10	6	12	9II	6	6	9II
11	011 MSD-TRN		3R-3	25-337 / 649	V-1A 25AB	V-2A 17AB	V-3C 9AB	11	1	L	19I	1	E	19I
					V-6G 14AB	V-5G 14AB	V-4G 14AB	11	6	12	10II	6	6	10II
12	012 MSD-TRN		3R-7	26-338 / 650	V4A 26AB	V-2A 18AB	V-3C 10AB	12	1	L	20I	1	E	20I
					V-6G 16AB	V-5G 16AB	V-4G 16AB	12	6	12	11II	6	6	11II
13	013 MSD-TRN		4R-1	32-344 / 656	V-1A 32AB	V-2A 24AB	V-3C 11AB	13	1	L	21I	1	E	21I
					V-6D 1AB	V-5D 1AB	V-4D 1AB	13	6	12	12II	6	6	12II
14	014 MSD-TRN		4R-2	33-345 / 657	V-1A 33AB	V-2A 25AB	V-3C 17AB	14	1	L	22I	1	E	22I
					V-6D 1CD	V-5D 1CD	V-4D 1DE	14	6	12	13II	6	6	13I
15	015 MSD-TRN		4R-3	34-346 / 658	V-1A 34AB	V-2A 26AB	V-3C 18AB	15	1	L	23I	1	E	23I
					V-6D 2AB	V-5D 2AB	V-4D 2AB	15	6	12	14II	6	6	14I
16	016 MSD-TRN		4R-4	35-347 / 659	V-1A 35AB	V-2A 27AB	V-3C 19AB	16	1	L	24I	1	E	24I
					V-6D 2CD	V-5D 2CD	V-4D 2DE	16	6	12	15II	6	6	15I

10161

CLB 2C

DETAILS

ITEM	CIRCUIT	ACTION	CHAN	CA	NEC CDF MUX S	NEC CDF MUX R	NEC CDF MUX SIG	TRK	TRAN BAY	TRAN BLK	TRAN TERM	REC BAY	REC BLK	REC TERM
	D R													
17	017 MSD-TRN	ESTAB	5R-1	43-355 / 667	V-1B 3AB	V-2B 35AB	V-3C 27AB	17	1	L	25I	1	E	25I
					V-6D 7AB	V-5D 7AB	V-4D 7AB	17	6	12	16II	6	6	16II
18	018 MSD-TRN		5R-2	44-356 / 668	V-1B 4AB	V-2B 36AB	V-3C 28AB	18	1	L	1II	1	E	1II
					V-6D 7CD	V-5D 7CD	V-4D 7DE	18	6	12	17II	6	6	17II
19	019 MSD-TRN		5R-3	45-357 / 669	V-1B 5AB	V-2B 37AB	V-3C 29AB	19	1	L	2II	1	E	2II
					V-6D 8AB	V-5D 8AB	V-4D 8AB	19	6	12	18II	6	6	18II
20	020 MSD-TRN		5R-4	46-358 / 670	V-1B 6AB	V-2B 38AB	V-3C 30AB	20	1	L	3II	1	E	3II
					V-6D 8CD	V-5D 8CD	V-4D 8DE	20	6	12	19II	6	6	19II
21	021 MSD-TRN		6R-2	56-368 / 680	V-1B 16AB	V-1C 8AB	V-3C 40AB	21	1	L	4II	1	E	4II
					V-6D 13CD	V-5D 13CD	V-4D 13DE	21	6	12	20II	6	6	20II
22	022 MSD-TRN		6R-3	57-369 / 681	V-1B 17AB	V-1C 9AB	V-3C 1AB	22	1	L	5II	1	E	5II
					V-6D 14AB	V-5D 14AB	V-4D 14AB	22	7	7	1I	7	1	1I
23	023 MSD-TRN		6R-4	58-370 / 682	V-1B 18AB	V-1C 10AB	V-3C 2AB	23	1	L	6II	1	E	6II
					V-6D 14CD	V-5D 14CD	V-4D 14DE	23	7	7	2I	7	1	2I
24	024 MSD-TRN		6R-5	59-371 / 683	V-1B 19AB	V-1C 11AB	V-3C 3AB	24	1	L	7II	1	E	7II
					V-6D 15AB	V-5D 15AB	V-4D 15AB	24	7	7	3I	7	1	3I

10161

ITEM	CIRCUIT	CTION	DETAILS													
			CHAN	CA	NEC CDF MUX S	NEC CDF MUX R	NEC CDF MUX SIG	TRK	TRAN BAY	TRAN BLK	TRAN TERM	REC BAY	REC BLK	REC TERM
25	D R 025MSD-TRN	ESTAB	6R-6	66-372 624	V-1B 20AB	V-1C 12AB	V-3C 11AB	25	1	L	8II	1	E	8II
					V-6D 15CD	V-5D 15CD	V-4D 15DE	25	7	7	4I	7	1	4I
26	026MSD-TRN		7R-1	67-379 631	V-1B 27AB	V-1C 19AB	V-3C 11AB	26	1	L	9II	1	E	9II
					V-6D 19AB	V-5D 19AB	V-4D 19AB	26	7	7	5I	1	1	5I
27	027MSD-TRN		7R-2	68-380 632	V-1B 28AB	V-1C 20AB	V-3C 12AB	27	1	L	10II	1	E	10II
					V-6D 19CD	V-5D 19CD	V-4D 19DE	27	7	7	6I	7	1	6I
28	028MSD-TRN		7R-3	69-381 633	V-1B 29AB	V-1C 21AB	V-3C 13AB	28	1	L	11II	1	E	11II
					V-6D 20AB	V-5D 20AB	V-4D 20AB	28	7	7	7I	7	1	7I
29	029MSD-TRN		7R-4	70-382 634	V-1B 30AB	V-1C 22AB	V-3C 14AB	29	1	L	12II	1	E	12II
					V-6D 20CD	V-5D 20CD	V-4D 20DE	29	7	7	8I	7	1	8I
30	030MSD-TRN		7R-5	71-383 635	V-1B 31AB	V-1C 23AB	V-3C 15AB	30	1	L	13II	1	E	13II
					V-6E 1AB	V-5E 1AB	V-4E 1AB	30	7	7	9I	7	1	9I
31	031MSD-TRN		7R-6	72-384 636	V-1B 32AB	V-1C 24AB	V-3C 16AB	31	1	L	14II	1	E	14II
					V-6E 1CD	V-5E 1CD	V-4E 1DE	31	7	7	10I	7	1	10I

10161

CLB 2C

ITEM	CIRCUIT	TION	DETAILS													
	LAST HOME C ROUTE		CHAN	CA	NEC CDF MUX S	NEC CDF MUX R	NEC CDF MUX SIG	TRK	TRAN BAY	TRAN BLK	TRAN TERM	REC BAY	REC BLK	REC TERM
32	032MSD-TRN	ESTAB	2R-11	21-333 / 645	V-1A 21AB	V-2A 13AB	V-3C 5AB	1	1	K	1I	1	D	1I
					V-6C 8AB	V-5C 8AB	V-4C 7AB	1	Y	9	5II	8	3	5II
33	033MSD-TRN		2R-12	22-334 / 646	V-1A 22AB	V-2A 14AB	V-3C 6AB	2	1	K	2I	1	D	2I
					V-6C 8CD	V-5C 8CD	V-4C 7DE	2	X	9	6II	8	3	6II
34	034MSD-TRN		3R-11	30-342 / 654	V-1A 30AB	V-2A 22AB	V-3C 14AB	3	1	K	3I	1	D	3I
					V-6G 18AB	V-5G 10AB	V-4G 9AE	3	X	9	7II	8	3	7II
35	035MSD-TRN		3R-12	31-343 / 655	V-1A 31AB	V-2A 23AB	V-3C 15AB	4	1	K	4I	1	D	4I
					V-6G 18CD	V-5G 10CD	V-4G 9DE	4	X	9	8II	8	3	8II

10161

CLB 2C

ITEM	CIRCUIT	ACTION	DETAILS												
			CHAN	CA	NEC CDF MUX			TRK	TRAN			REC		
					S	R	SIG		BAY	BLK	TERM	BAY	BLK	TERM
36	D R 101 TRN-MSD	ESTAB	1R-9	8-332 634	V-6C 1AB	V-5C 1AB	V-4C 1AB	1	3	11	2I	3	5	2I
					V-1A 8AB	V-2A 40AB	V-3B 32AB	1	1	H	15I	1	B	15I
37	102 TRN-MSD		1R-10	9-333 635	V-6C 1CD	V-5C 1CD	V-4C 1DE	2	3	11	3I	3	5	3I
					V-1A 9AB	V-2A 41AB	V-3B 33AB	2	1	H	16I	1	B	16I
38	103 TRN-MSD		1R-11	10-334 637	V-6C 2AB	V-5C 2AB	V-4C AB	3	3	11	4I	3	5	4I
					V-1A 10AB	V-2A 42AB	V-3B 34AB	3	1	H	17I	1	B	17I
39	104 TRN-MSD		2R-9	19-331 627	V-6C 7AB	V-5C 7AB	V-4C 3AB	4	3	11	5I	3	5	5I
					V-1A 19AB	V-2A 11AB	V-3C 3AB	4	1	H	18I	1	B	18I
40	105 TRN-MSD		2R-10	20-332 639	V-6C 7CD	V-5C 7CD	V-4C 7DE	5	3	11	6I	3	5	6I
					V-1A 20AB	V-2A 12AB	V-3C 4AB	5	1	H	19I	1	B	19I
41	106 TRN-MSD		3R-8	27-350 651	V-6G 16CD	V-5G 16CD	V-4G 16DE	6	3	11	7I	3	5	7I
					V-1A 27AB	V-2A 19AB	V-3C 11AB	6	1	H	20I	1	B	20I
42	107 TRN-MSD		3R-9	28-340 652	V-6G 17AB	V-5G 17AB	V-4G 17AB	7	3	11	8I	3	5	8I
					V-1A 28AB	V-2A 20AB	V-3C 12AB	7	1	H	21I	1	B	21I
43	108 TRN-MSD		3R-10	29-341 653	V-6G 17CD	V-5G 17CD	V-4G 17DE	8	3	11	9I	3	5	9I
					V-1A 29AB	V-2A 21AB	V-3C 13AB	8	1	H	22I	1	B	22I

10161

ITEM	CIRCUIT	SECTION	DETAILS												
			CHAN	CA	NEC CDF MUX S	NEC CDF MUX R	NEC CDF MUX SIG	TRK	TRAN BAY	TRAN BLK	TRAN TERM	REC BAY	REC BLK	REC TERM
44	DR 109 TRN-MSD	ESTAB	4R-5	35-348 / 660	V-6D 3AB	V-5D 3AB	V-4D 3AB	9	3	11	10 I	3	5	10 I
					V-1A 36AB	V-2A 28AB	V-3C 21AB	9	1	H	23 I	1	B	23 I
45	110 TRN-MSD		4R-6	37-349 / 661	V-6D 3CD	V-5D 3CD	V-4D 3DE	10	3	11	11 I	3	5	11 I
					V-1A 37AB	V-2A 29AB	V-3C 21AB	10	1	H	24 I	1	B	24 I
46	111 TRN-MSD		4R-7	38-350 / 662	V-6D 4AB	V-5D 4AB	V-4D 4AB	11	3	11	12 I	3	5	12 I
					V-1A 38AB	V-2A 30AB	V-3C 22AB	11	1	H	25 I	1	B	25 I
47	112 TRN-MSD		4R-9	39-351 / 663	V-6D 5AB	V-5D 5AB	V-4D 5AB	12	3	11	13 I	3	5	13 I
					V-1A 39AB	V-2A 31AB	V-3C 23AB	12	1	H	1 II	1	B	1 II
48	113 TRN-MSD		5R-5	47-359 / 671	V-6D 9AB	V-5D 9AB	V-4D 9AB	13	3	11	14 I	3	5	14 I
					V-1B 7AB	V-2B 39AB	V-3C 31AB	13	1	H	2 II	1	B	2 II
49	114 TRN-MSD		5R-6	48-360 / 672	V-6D 3CD	V-5D 1CD	V-4D 9DE	14	3	11	15 I	3	5	15 I
					V-1B 8AB	V-2B 40AB	V-3C 32AB	14	1	H	3 II	1	B	3 II
50	115 TRN-MSD		5R-7	49-361 / 673	V-6D 10AB	V-5D 10AB	V-4D 10AB	15	3	11	16 I	3	5	16 I
					V-1B 9AB	V-1C 1AB	V-3C 33AB	15	1	H	4 II	1	B	4 II
51	116 TRN-MSD		5R-8	50-362 / 674	V-6D 10CD	V-5D 10CD	V-4D 10DE	16	3	10	13 II	3	4	13 II
					V-1B 10AB	V-1C 2AB	V-3C 34AB	16	1	H	5 II	1	B	5 II

ITEM	CIRCUIT	SECTION	DETAILS													
					NEC CDF MUX				TRAN				REC			
			CHAN	CA	S	R	SIG	TRK	BAY	BLK	TERM		BAY	BLK	TERM	
52	D R 117 TRN-MSD	ESTAB	6R-7	61-373 685	V-6D 16AB	V-5D 16AB	V-4D 16AB	17	3	10	14 II		3	4	14 II	
					V-1B 21AB	V-1C 13AB	V-3C 5AB	17	1	H	6 II		1	B	6 II	
53	118 TRN-MSD		6R-8	62-374 686	V-6D 16CD	V-5D 16CD	V-4D 16DE	18	3	10	15 II		3	4	15 II	
					V-1B 22AB	V-1C 14AB	V-3C 6AB	18	1	H	7 II		1	B	7 II	
54	119 TRN-MSD		6R-9	63-375 687	V-6D 17AB	V-5D 17AB	V-4D 17AB	19	3	10	16 II		3	4	16 II	
					V-1B 23AB	V-1C 15AB	V-3C 7AB	19	1	H	8 II		1	B	8 II	
55	120 TRN-MSD		7R-7	73-385 697	V-6E 2AB	V-5E 2AB	V-4E 2AB	20	3	10	17 II		3	4	17 II	
					V-1B 33AB	V-1C 25AB	V-3C 17AB	20	1	H	9 II		1	B	9 II	
56	121 TRN-MSD		7R-8	74-386 698	V-6E 2CD	V-5E 2CD	V-4E 2DE	21	3	10	18 II		3	4	18 II	
					V-1B 34AB	V-1C 26AB	V-3C 18AB	21	1	H	10 II		1	B	10 II	
57	122 TRN-MSD		7R-9	75-387 699	V-6E 3AB	V-5E 3AB	V-4E 3AB	22	3	10	19 II		3	4	19 II	
					V-1B 35AB	V-1C 27AB	V-3C 19AB	22	1	H	11 II		1	B	11 II	
58	123 TRN-MSD		7R-10	76-388 700	V-6E 3CD	V-5E 3CD	V-4E 3DE	23	3	10	20 II		3	4	20 II	
					V-1B 36AB	V-1C 28AB	V-3C 20AB	23	1	H	12 II		1	B	12 II	

'61

ITEM	CIRCUIT	SECTION	DETAILS												
			CHAN	CA	NEC CDF MUX S	NEC CDF MUX R	NEC CDF MUX SIG	TRK	TRAN BAY	TRAN BLK	TRAN TERM	REC BAY	REC BLK	REC TERM
59	LCR 124 TRN-MSD	ESTAB	4R-10	40-352 664	V-6D 5CD	V-5D 5CD	V-4D 5DE	1	1	J	11 I	1	3	4I
					V-1A 40AB	V-2A 37AB	V-3C 24AB	1	1	H	13 II	1	B	13 II
60	125 TRN-MSD		4R-11	41-353 665	V-6D 6AB	V-5D 6AB	V-4D 6AB	2	1	J	5 I	1	3	5I
					V-1B 1AB	V-2B 33AB	V-3C 25AB	2	1	H	14 II	1	B	14 II
61	126 TRN-MSD		4R-12	42-354 666	V-6D 6CD	V-5D 6CD	V-4D 6DE	3	1	J	6 I	1	3	6I
					V-1B 2AB	V-2B 34AB	V-3C 26AB	3	1	H	15 II	1	B	15 II
62	127 TRN-MSD		5R-9	51-363 675	V-6D 11AB	V-5D 11AB	V-4D 11AB	4	1	J	7 I	1	3	7I
					V-1B 11AB	V-1C 3AB	V-3C 35AB	4	1	H	16 II	1	B	16 II
63	128 TRN-MSD		5R-10	52-364 676	V-6D 11CD	V-5D 11CD	V-4D 11DE	5	1	J	8 I	1	3	8 I
					V-1B 12AB	V-1C 4AB	V-3C 36AB	5	1	H	17 II	1	B	17 II
64	129 TRN-MSD		5R-11	53-365 677	V-6D 12AB	V-5D 12AB	V-4D 12AB	6	1	K	5 II	1	2	5 II
					V-1B 13AB	V-1C 5AB	V-3C 37AB	6	1	H	18 II	1	B	18 II
65	130 TRN-MSD		5R-12	54-366 678	V-6D 12CD	V-5D 12CD	V-4D 12DE	7	1	K	6 II	1	2	6 II
					V-1B 14AB	V-1C 6AB	V-3C 38AB	7	1	H	19 II	1	B	19 II
66	131 TRN-MSD	V	6R-10	61-376 688	V-6D 17CD	V-5D 17CD	V-4D 17DE	8	1	K	7 II	1	2	7 II
					V-1B 24AB	V-1C 16AB	V-3C 3AB	8	1	H	20 II	1	B	20 II

10161

CLB 2C

ITEM	CIRCUIT	SECTION	DETAILS												
			CHAN	CA	NEC CDF MUX S	NEC CDF MUX R	NEC CDF MUX SIG	TRK	TRAN BAY	TRAN BLK	TRAN TERM	REC BAY	REC BLK	REC TERM
67	LCR 13ZTRN-MSD	ESTAB	6R-11		V-6D 18AB	V-5D 18AB	V-4D 18AB	9	1	X	X II	1	Z	X II
				65-377 / 693	V-1B 25AB	V-1C 17AB	V-3C 9AB	9	1	H	21 II	1	B	21 II
68	133TRN-MSD		6R-12		V-6D 18CD	V-5D 18CD	V-4D 18DE	10	1	X	9 II	1	Z	9 II
				66-378 / 690	V-1B 26AB	V-1C 18AB	V-3C 10AB	10	1	H	22 II	1	B	22 II

10161

IMPERIAL GOVERNMENT OF IRAN

Ministry of Posts, Telegraph & Telephone
Directorate of Network Control

CIRCUIT CONTROL DEPARTMENT (CLB)

P.O.Box: 12/1135 Tehran

Tel: 770698

CIRCUIT ORDER

Date 16-7-74 Prepared By H. Elmi.

Due See Note Control Office _____ Report Comp

This order is issued to establish the initial task-1 Multiplex. Requirements for these circuit are shown in the NCCRL and 577C B.O.M.

NOTE: The due date of this circuit order shall be 5 days after notification from ITA/PMO that preliminary acceptance tests have been successfully completed on these facilities.

Dist: 2-TSCC, 1-GNPS, 2-PGM, 1-PCE, 2-RST, 2-PMO, 1-PMO/MUX, 2-BBL, 2-BDP
2-RMR, 2-LGD, 2-RDR, 2-SSR, 2-BLR, 2-SRI, 2-BHR, 2-GGN, 2-GQS,
2-SRD, 2-LJN, 2-NKA, 2-BFZ, 2-CLS, 2-MZD, 2-ABR, 2-SHI.

C.O. 10341

ITEM	CIRCUIT	ACTION	DETAILS
		ESTAB	
1	R1 RST-120 SHI-146/I		FAX: 1200 Channel HD-RADIO TERMINAL 1, RST-120 TO TERMINAL 4, SHI - 146/I
2	R1 BDP- 121 RST- 120		FAX: 600 CHANNEL MD-RADIO TERMINAL 1, BDP-121 TO TERMINAL 4, RST - 120
3	R1 ABR - 127 LGD - 131		FAX: 120 CHANNEL LD-RADIO TERMINAL 3, ABR - 127 TO TERMINAL 1, LGD - 131
4	R1 ABR - 127 RSR - 133		FAX: 120 CHANNAL LD-RADIO TERMINAL 2, ABR - 127 TO TERMINAL 1, RSR - 133
5	R1 KNY - 135 RMR - 136		FAX: 600 CHANNEL MD-RADIO TERMINAL 2, KMY - 135 TO TERMINAL 1, RMR-136
6	R1 BBL - 147 BLR - 148		FAX: 600 CHANNEL MD-RADIO TERMINAL 2, BBL - 148 TO TERMINAL 1, BLR - 148
7	R1 GGN - 161 GGN - 158		FAX: 600 CHANNEL MD-RADIO TERMINAL 1, GGN - 161 TO TERMINAL 2, GGN - 158
8	R1 GQS - 165 SRD - 172		FAX: 1200 CHANNEL HD - RADIO TERMINAL 2, GQS - 165 TO TERMINAL 1, SRD - 172
9	R1 CLS - 142 MZD - 178		FAX: 24 CHANNEL VHF RADIO TERMINAL 2, CLS - 142 TO TERMINAL 1, MZD 178
			C.O. 10341

ITEM	CIRCUIT	ACTION	DETAILS
10	R1 ABR - 127 LJN - 128	ESTB	FAX: 120 CHANNEL LD-RADIO TERMINAL 5, ABR - 127 TO TERMINAL 1, LJN - 128
11	R1 ABR - 127 BFZ - 129		FAX: 120 CHANNEL LD-RADIO TERMINAL 4, ABR - 127 TO TERMINAL 1, BFZ - 129
12	R1 SHI - 149 GQS - 165		FAX: 1200 CHANNEL HD-RADIO TERMINAL 1, SHI - 146/I TO TERMINAL 4 GQS - 165
13	R1 GQS - 165 MSD - 918	✓	FAX: 1200 CHANNEL HD-RADIO TERMINAL 1, GQS - 165 TO TERMINAL 3, MSD - 918

C.O. 10341

CLE 2

ITEM	CIRCUIT		SECTION	DETAIL				
				TERMINAL	SUPERGROUP	GROUP	CHANNELS	NOTES
14	SG1R1	BBL-147	ESTAB	1	12			
		SHI-146/I		3	12	SUPERGROUP PATCH LEVEL AT SHI-146/I		
		SHI-146/I		4	11			
		RST-120		1	11			
15	1R	BBL-147			SG1R1 BBL-147	3	1-12	
		RST-120			RST-120	3	1-12	
16	SG1R1	BDP-121		1	1	-	-	
		RST-120		4	1			
17	1R	BDP-121			SG1R1 BDP-121	3		Only Base Group
		RST-120			RST-120	3		
18	2R	BDP-121			SG1R1 BDP-121	2	1-12	
		RST-120			RST-120	2	1-12	
19	3R	BDP-121			SG1R1 BDP-121	4	1-12	
		RST-120			RST-120	4	1-12	
20	SG1R1	RST-120		1	4	-	-	
		KMY-135		3	4			
21	SG1R1	RMR-136		1	1	-	-	
		KMY-135		2	1			
22	2R	RST-120			SG1R1 RST-120	2		Only Base Group
		RMR-136			KMY-135	2	GROUP PATCH LEVEL AT KMY-135	
					SG1R1 KMY-135	4		
					RMR-136	4		Only Base Group
23	1R	RST-120			SG1R1 RST-120	1	1-12	
		RMR-136			KMY-135	1	GROUP PATCH LEVEL AT KMY-135	
					KMY-135	3		
					RMR-120	3	1-12	C.O. 10341

ITEM	CIRCUIT	ACTION	DETAILS				
			TERMINAL	SUPERGROUP	GROUP	CHANNELS	NOTE
24	SG1R1 ABR-127 LGD-131	ESTAB	3 1	1 1			
25	SG1R1 ABR-127 RDR-133		2 1	2 2			
26	1R LGD-131 RDR-133			SG1R1 LGD-131 ABR-127 SG1R1 ABR-127 RDR-133	1 1 1 1	1-12 GROUP PATCH LEVEL AT ABR-127 1-12	
27	SG1R1 BBL-147 SHI-146/I SHI-146/I KMY-135		1 3 4 1	18 18 4 4		SUPERGROUP PATCH LEVEL AT SHI-146/I	
28	1R BBL-147 RMR-136		1 1	SG1R1 RMR-136 KMY-135 SG1R1 KMY-135 BBL-147	2 2 3 3	ONLY BASE GROUP GROUP PATCH LEVEL AT KMY-135 ONLY BASE GROUP	
29	SG1R1 RMR-136 KMY-135 KMY-135 SSR-137		1 2 1 1	2 2 3 3		SUPERGROUP PATCH LEVEL AT KMY-135	
30	1R RMR-136 SSR-137			SG1R1 RMR-136 SSR-137	1 1	1-12 1-12	
31	2R RMR-136 SSR-137			SG1R1	2 2	1-12 1-12	
32	3R RMR-136 SSR-137			SG1R1	3 3	1-8 1-8	
							C.O. 10341

ITEM	CIRCUIT	ACTION	DETAIL				
			TERMINAL	SUPERGROUP	GROUP	CHANNELS	NOTE
33	SG1R1 BBL-147 BLR-148	ESTAB	2 1	7 7			
34	1R BBL-147 BLR-148			SG1R1 BBL-147 BLR-148	1 1	1-12 1-12	
35	2R BBL-147 BLR-148			SG1R1	2 2	1-12 1-12	
36	3R BBL-147 BLR-148			SG1R1	3 3	1-12 1-12	
37	SG1R1 BBL-147 SHI-146/I SHI-146/I SRI-150		1 3 1 1	13 13 4 4	SUPERGROUP PATCH LEVEL AT SHI-146/I		
38	1R BBL-147 SRI-150			SG1R1 BBL-147 SRI-150	3 3	1-12 1-12	
39	2R BBL-147 SRI-150			SG1R1 BBL-147 SRI-150	4 4	1-12 1-12	
40	3R BBL-147 SRI-150			SG1R1 BBL-147 SRI-150	5 5	1-12 1-12	
41	SG1R1 BHR-155 GGN-158		1 5	2 2	-	-	
42	SG1R1 GGN-158 GGN-161		2 1	4 4	-	-	
43	1F BHR-155 GGN-161			SG1R1 BHR-155 GGN-158 SG1R1 GGN-158 GGN-161	1 1 4 4	1-12 GROUP PATCH LEVEL GGN-158 1-12	C.O. 10341

CLB 2

ITEM	CIRCUIT		ACTION	DETAILS				
				TERMINAL	SUPERGROUP	GROUP	CHANNELS	NOTE
44	SG1R1	GGN-158	ESTAB	1	3			
		GQS-165		4	3			
45	SG1R1	GQS-165		2	5			
		SRD-172		1	5			
46	1R	GGN-161		1	SG1R1 GGN-161	2	1-12	
					GGN-158	2	GROUP PATCH LEVEL AT GGN-158	
					SG1R1 GGN-158	1	GROUP PATCH LEVEL AT GQS-165	
					GQS-165	1		
					SG1R1 GQS-165	2	1-12	
		SRD-172		1	SRD-172	2		
47	2R	GGN-161			SG1R1 GGN-161	3	1-12	
					GGN-158	3	GROUP PATCH LEVEL AT GGN-158	
					SG1R1 GGN-158	2	GROUP PATCH LEVEL AT GQS-165	
					GQS-165	2		
					SG1R1 GQS-165	3		
		SRD-172			SRD-172	3	1-12	
48	SG1R1	BRH-162		1	1			
		GGN-158		4	1	-	-	
49	1R	BRH-162			SG1R1 GGN-161	1	1-12	
		GGN-161			GGN-158	1	GROUP PATCH LEVEL AT GGN-158	
					SG1R1 GGN-158	2		
					BRH-162	2	1-12	
50	SG1R1	BBL-147		1	15			
		SHI-146/I		3	15		SUPERGROUP PATCH LEVEL AT SHI-146-I	
		SHI-146/I		1	13			
		GQS-165		4	13			
51	1R	BBL-147			SG1R1 BBL-147	1	1	
		GQS-165			GQS-165	1	1	
								C.O. 10341

SLD 2

ITEM	CIRCUIT	ACTION	DETAIL				
			TERMINAL	SUPERGROUP	GROUP	CHANNELS	NOTES
52	2R BBL-147 GQS-165	ESTAB		SG1R1 BBL-147 GQS-165	3 3		ONLY BASE GROUP "
53	1R GQS-165 SRD-172			SG1R1 GQS-165 SRD-172	1 1	1-3 1-3	
54	SG1R1 GGN-161 GGN-158		1 2	2 2	-	-	
55	1R GGN-161 GQS-165		1 4	SG1R1 GGN-161 GGN-158 SG1R1 GGN-158 GQS-165	1 1 4 4	1-8 GROUP PATCH LEVEL AT GGN-158 1-8	
56	2R GGN-161 GQS-165			SG1R1 GGN-161 GGN-158 SG1R1 GGN-158 GQS-165	5 5 3 3	1-12 GROUP PATCH LEVEL GGN-158 1-12	
57	SG1R1 ABR-127 RST-120		1 1	2 2			
58	1R RST-120 LGD-131		1 1	SG1R1 RST-120 ABR-127 SG1R1 ABR-127 LGD-131	3 3 2 2	1-12 GROUP PATCH LEVEL AT ABR-127 1-12	
59	2R RST-120 LGD-131			SG1R1 RST-120 ABR-127 SG1R1 ABR-127 LGD-131	4 4 3 3	1-10 GROUP PATCH LEVEL AT ABR-127 1-10	
							C.O. 10341

ITEM	CIRCUIT SECTION	ESTAB	DETAIL				
			TERMINAL	SUPERGROUP	GROUP	CHANNELS	NOTE
60	SG1R1 RST-120 SSR-137		1 1	8 8	-	-	
61	1R RST-120 SSR-137			SG1R1 RST-120 SSR-137	3 3	1-12 1-12	
62	2R RST-120 SSR-137			SG1R1 RST-120 SSR-137	4 4	1-12 1-12	
63	SG1R1 LJN-128 ABR-127 ABR-127 RST-128		1 5 1 1	2 2 1 1	SUPERGROUP PATCH LEVEL AT ABR-127		
64	1R LJN-128 RST-120			SG1R1 RST-120 LJN-128	1 1	1-12 1-12	
65	2R LJN-128 RST-120			SG1R1 RST-120 LJN-128	2 2	1-12 1-12	
66	4R BDP-121 RST-120			SG1R1 BDP-121 RST-120	5 5	1-12 1-12	
67	SG1R1 BHR-155 NKA-154		1 1	1 1	—	—	
68	1R BHR-155 NKA-154			SG1R1 BHR-155 NKA-154	1 1	1-12 1-12	
69	SG1R1 ABR-127 BFZ-129		4 1	1 1	-	-	
							C.O. 10341

ITEM	CIRCUIT	CTION	DETA				
			TERMINAL	SUPERGROUP	GROUP	CHANNELS	NOTE
70	1R BFZ-129 RST-120	ESTAB		SG1R1 BFZ-129 ABR-127 SG1R1 ABR-127 RST-120	2 2 2 2	1-12 GROUP PATCH LEVEL AT ABR-127 1-12	
71	SG1R1 CLS-142 MZD-178		2 1	VHF VHF	-	-	
72	1R CLS-142 MZD-178			SG1R1 CLS-142 MZD-178	B B	1-2 1-2	
73	2R BBL-147 RMR-136			SG1R1 RMR-136 KMY-135 SG1R1 KMY-135 BBL-147	1 1 1 1	1-2 GROUP PATCH LEVEL AT KMY-135 1-2	
74	1R ABR-127 RDR-133			SG1R1 ABR-127 RDR-133	2 2	1-4 1-4	
75	1R BHR-155 GGN-158			SG1R1 BHR-155 GGN-158	2 2	1-2 1-2	
76	1R GGN-161 GGN-158			SG2R1 GGN-161 GGN-158	2 2	1-4 1-4	
77	SG1R1 GGN-158 SRI-150		5 1	5 5	-	-	
78	1R GGN-158 SRI-150			SG1R1 GGN-158 SRI-150	2 2	1-3 1-3	

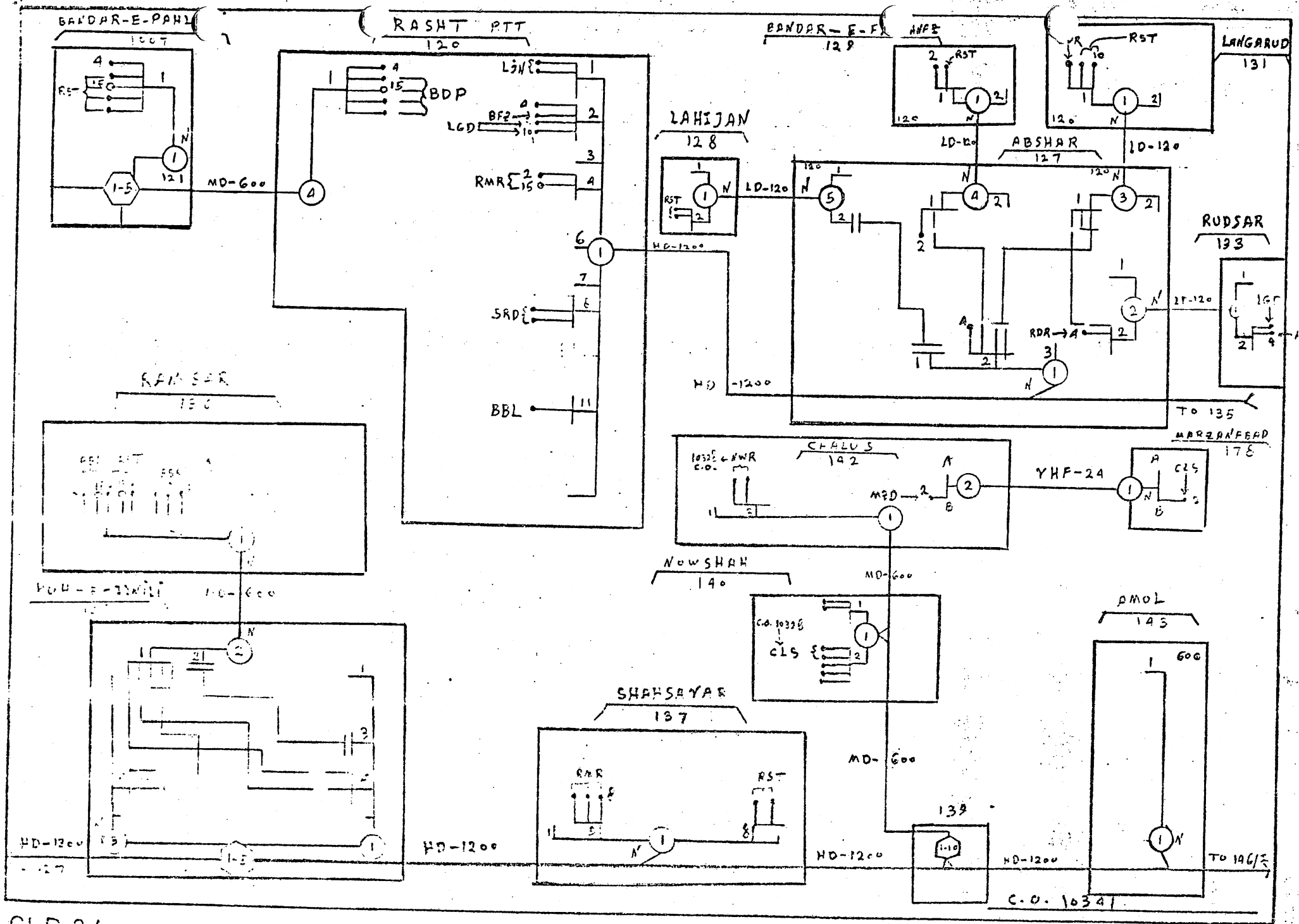
C.C. 10381

CLB 2

ITEM	CIRCUIT		ACTION	DETAILS				
				TERMINAL	SUPERGROUP	GROUP	CHANNELS	NOTES
8c	SG1R1	BBL-147	ESTAB	1	16			
		SHI-146/I		3	16	SUPERGROUP PATCH LEVEL AT SHI-146/I		
		SHI-146/I		1	8			
		GGN-158		5	8			
81	1R	BBL-147			SG1R1 BBL-147	2	1-2	
		GGN-158			GGN-158	2	1-2	
82	1R	GGN-158			SG1R1 GGN-158	5	1-2	
		GQS-165			GQS-165	5	1-2	
83	4R	BBL-147			SG1R1 BBL-147	4	1-12	
		BLR-148			BLR-148	4	1-12	

C.O. 10341

CLB 2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1007
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MD-600
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128
LD-120
BANDAR-E-PAHLI
129
YHF
RST
LANGARUD
131
ABSHAR
127
RUDSAR
193
TO 135
RAMSAR
130
CHALUS
142
YHF-24
MARZANABAD
178
NOWSHAR
140
CLS
AMOL
145
SHAHSAVAR
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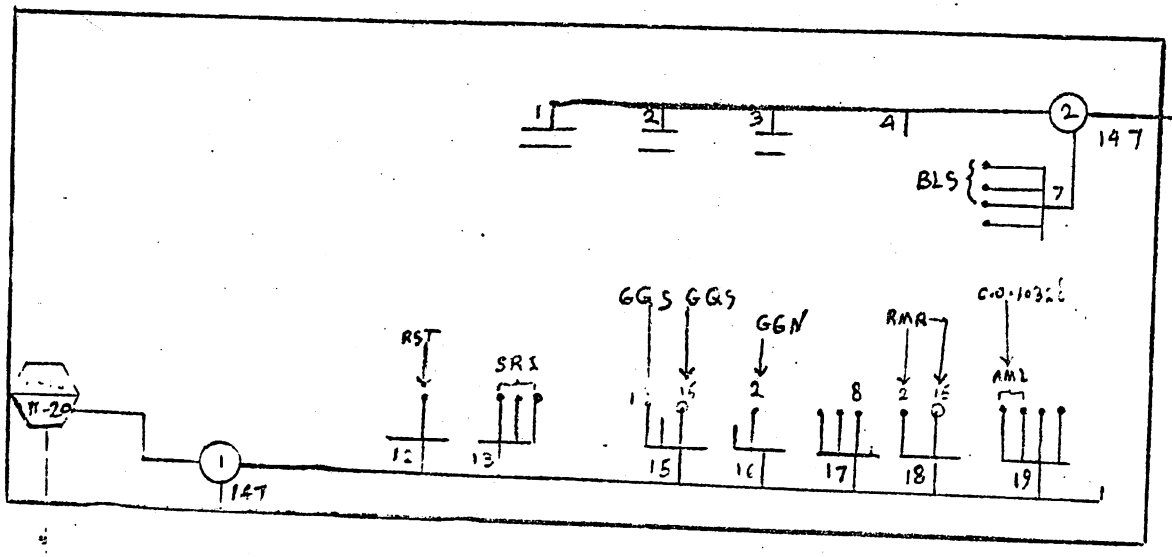
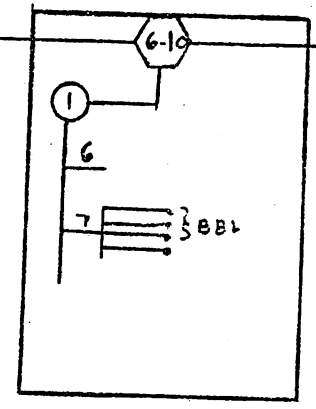
C.O. 1034
TO 146/2
HD-1200

CLB 2A

BOBOL
147

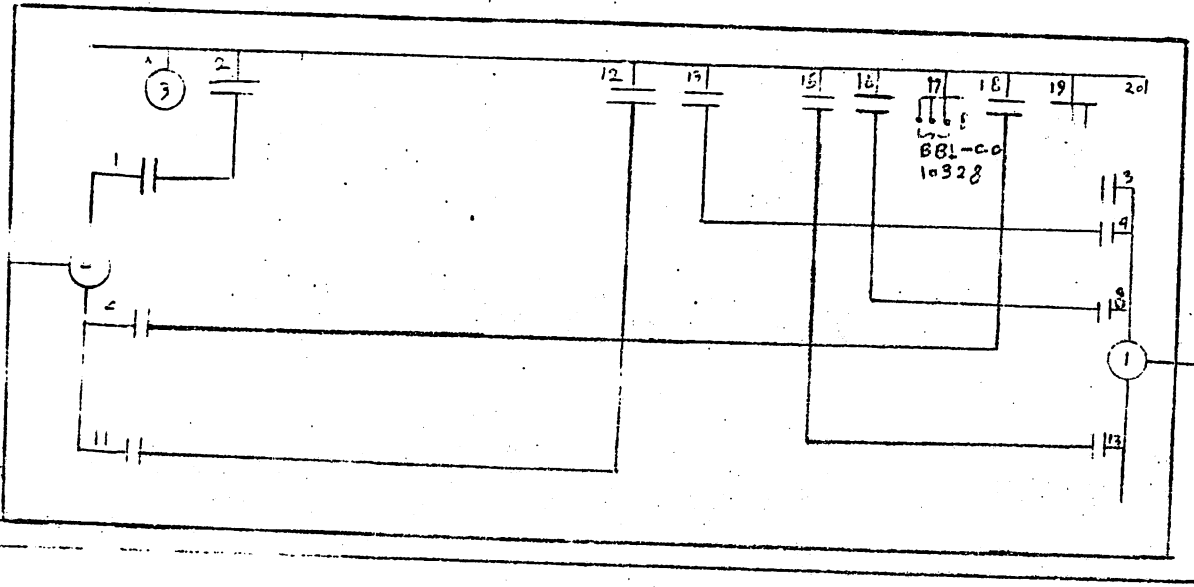
BABOLSAR
148





LD-240

SHAHI
140/I



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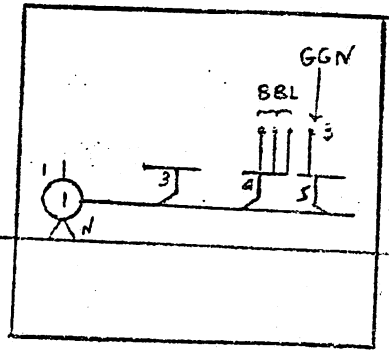
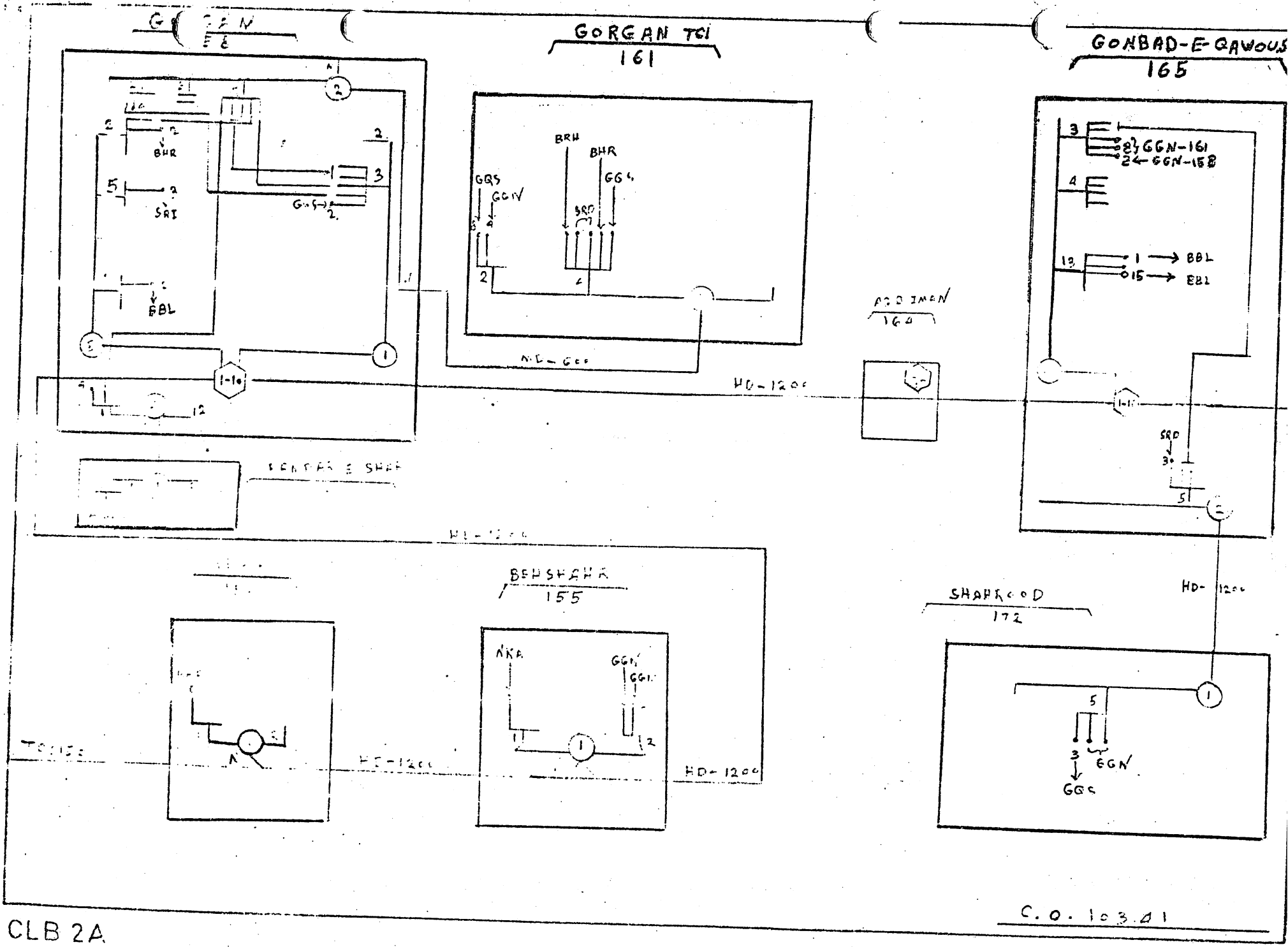
150



C.O. 10341

CLB 2A



C.O. 103.01

CLB 2A

R. C. HARRIS

IRAN TRIP REPORT

Introduction

During the period of February 24 to March 1, 1975, a Bell System team visited Iran in an effort to determine what roles the Bell System might play in improving the telecommunications services in Iran. The team's principal purpose was to determine what items might be included in a Statement of Work to become part of any contract that might be negotiated between the AT&T Company and the Iranian PTT and its subsidiary organizations. A list of the team members is attached as Table I.

This memorandum will address one aspect of the team's investigation - intercity transmission. Other team members will address other aspects. The purpose of this memorandum is to provide information for anyone else who may be asked to participate in a Bell System effort in Iran.

Organizations Visited*

The team visited Iran at the request of the Minister of Posts, Telephone and Telegraph (PTT). While Messrs. Baird, Bright and Rickman met with the Minister, the other team members conducted their investigations within subsidiary organizations as follows:

1. Telecommunications Corporation of Iran (TCI)

   This is the "telephone company" with a corporate structure but without public stock and with its board composed of governmental ministers. TCI has been established as a profit-making entity but their management believes it more important that they provide a good telecommunications system to support Iran's growing industrialization. With the exception of a kick-off meeting which included the Chairman of the Board and Managing Director of TCI, Mr. Malek Abhari, and visits to operating locations, our contacts with TCI were through the 2M56 program office. The 2M56 designation is a short form for 2 Million telephones by the end of 1356 on the Iranian calendar.** This corresponds to the end of the current 5-year plan period and to March 21, 1978 on the Christian calendar. TCI's function is to provide local telephone service throughout the country and they believe their duties also include intercity transmission responsibility for telephone services and video. While they (TCI) are

*A partial list of people visited is attached as Table II.
**2M56 is budgeted at $2.5 Billion.

assuming maintenance responsibility for the intercity microwave systems, it is not clear that the planning of future systems is within their purview.

2. Program Management Office (PMO)

This is an organization reporting to a Director General of PTT and not a part of TCI. Its principle function is management of the Integrated National Telecommunications System (INTS) project. This project entails the construction of a nationwide microwave network, and some associated side legs, overlaying an existing smaller microwave network constructed under two or three earlier projects. In addition, PMO is laying out the multiplex sections required to meet the needs of the National Combined Circuit Requirements List (NCCRL). The "Combined" means TCI plus military needs, with each representing about half the total requirements. The system construction is nearing completion so that PMO effort is winding down.

3. Directorate of Network Control (DNC)

This organization issues Circuit Orders for the intercity circuit requirements and maintains all equipment records from 6-wire frame to 6-wire frame. They are also responsible for facility management in the intercity network. This organization reports directly to the Managing Director of Planning in the PTT. While not a part of PMO, it depends on PMO for support and for personnel. DNC is having installed at TCI's toll center in Tehran (the Sepah Square building) a centralized telemetry system to monitor conditions at every microwave station in the network*. It is not clear whether or not commands can be sent to the stations from this central location. As part of their facility management function, the people at DNC have prepared 779 pages of reroute and restoration plans covering every station in the network. They have also designed what they consider "idiot-proof" patching facilities to permit them to exercise these plans. Unfortunately, no funding has been available for installation of the patching facilities. (One exception is a supergroup restoration capability between Tehran and the international satellite earth station near Asadabad.)

Perhaps a list of the organizations not visited, but who are involved in intercity transmission matters should also be included. They are:

*In this telemetry system a steady light indicates a previously reported and acknowledged abnormal condition at a particular station. A flashing light indicates a change in state, i.e. a new alarm or clearance of an old one. Since such a few lamps were dark, one wondered if they weren't just burned out bulbs. This is unfair since the telemetry system hasn't been accepted yet.

1. Imperial Iranian Armed Forces (IIAF)

The military establishment used roughly one half of the assigned capacity of the intercity facilities. In addition, they operate some systems of their own. TCI tells us that the military operates systems in the 4 GHz band using frequency-hopping security techniques. The extent of the military systems is unknown. No contact was made with Philco-Ford who has a contract for some military communications facilities.

2. Iranian National Television (INTV) and Iranian National Radio

The broadcast people look to TCI for transmission facilities. It is alleged that INTV requested a very large increase in channel miles of video facilities. They also want four channels to villages not now served. For more on this see Project Vilcom below.

3. Iranian National Oil Company, Iranian National Gas Company and the Gas and Water Board

Each of these "right-of-way" organizations operates its own facilities, the extent of which is unknown.

4. Ministry of Agriculture

This Ministry apparently is the agency pressing for telecommunications facilities to rural villages. See Project Vilcom below for further information.

5. The Directorate in PTT responsible for Spectrum Management

A Mr. Hakimian has just been given this assignment. Spectrum management has been described as "non-existant" and "in chaos". Time did not permit a visit to Mr. Hakimian.

6. GNPS

This is the consortium of GTE-Italy, Nippon Electric, Page Communications Engineers, and Siemens who are building INTS. Their image is badly tarnished, but we did not hear their side of the story.

7. The State Police

The police are considering construction of a data network separate from the TCI network to meet their own needs and as a common carrier for other users.

Present Iranian Intercity Network

Figure 1, attached, shows the equipped capacity of the Iranian intercity broadband network upon completion of the present construction effort on the Integrated National Telecommunications System (INTS). In addition to INTS, the network comprises facilities provided in connection with earlier projects known as CENTO, "7-links" and "3-1". The physical routing and radio repeater stations are shown on Figure 2. A highway map is also attached as Figure 3. Comparison of the facilities map with the highway map shows that the country does have broadband facilities interconnecting all major cities, generally with multiple route capability. (The large area not served is desert.)

The broadband network is provided via radio relay systems generally in the 6 GHz band. Some use is made of the "Upper 6" band (6425-7250 GHz) and the old CENTO route utilizes the 2 GHz band. A 120 channel troposcatter system operating near 2 GHz is used to cross the mountains east of Ahwaz. VHF and UHF radio, as well as a few short VF cables, are used to serve military and civilian terminals as side legs from the major routes as shown on Figure 2. Additionally, several manual exchanges are connected to nearby cities via open wire lines. The size and number of these installations were not investigated.

The network provides a high degree of video connectivity. Video service is available in both directions between Tehran and all provincial capitals, usually on dedicated radio channels, but in a few cases by a combination of dedicated and protection channels. Additional cities can also be served through the use of protection channels as well as the dedicated video facilities.

The Figures give the impression that the radio systems might be expandable to care for Iran's intercity needs for some time to come. Unfortunately, the potential for expansion may be rather limited by past engineering decisions. Due to capital budget limitations existing when the present systems were planned, frequency plans were adopted which required only a single antenna at a station for transmission and reception on a given path and the towers were sized accordingly. It is feared that those towers would not support the additional antennas required to expand the routes to the full capacity. (Indeed, consultants are now reviewing tower strengths and loads and it is feared that some may already be overloaded.)

There are some ineffeciencies existing that could be removed to increase the circuit carrying capacity of the routes. For instance, 600-channel and 960-channel equipment could be replaced by 1800 channel equipment. Each project was built with its own 1x1 or 1x2 protection scheme so that some routes have two protection channels where one would be adequate. By using the protection channel suitable for the highest channel capacity and multi-line switching, an additional message or TV channel could be made available within the present frequency plan. Replacement of all present FM equipment with single sideband equipment could also materially increase the circuit capacity of present land, buildings, antennas, frequency assignments, etc. More extensive use of "round robin" techniques could add to the video capability of the present network. Use of other frequency bands (e.g., 4 GHz wherever no conflict exists with other users) could be useful in expanding both video and message capability of existing routes.

A much more detailed investigation into the limitations and possibilities of the existing network than could be made in the few days spent on this visit is required before specific recommendations can be made for expansion. And the first requirement for any recommendation would be some estimate of future circuit requirements and a long range facility plan to satisfy those requirements.

Facility Planning

By their own admission, the Iranians badly need a fundamental facility plan and some super agency to coordinate the activities of the several organizations in the PTT. This is an area in which they think AT&T could be very helpful to them.

In preparing their transmission facility specifications they rely completely on CCITT/CCIR Recommendations. If there is a transmission plan it isn't known to all organizations. They have interface problems such as some systems operating at +7, -16 dBm levels and others at +4, -13 dBm. All trunks are one-way operation. All of the technical matters could rather easily be standarized, but the most important gap is the absence of a long range plan and an organization to produce one.

Someone, I don't know who, decided several years ago to build the microwave network of the INTS project. This network was overlaid on the existing network without adequate integration of the two, its seems to me. For instance, the circuits of INTS terminate on different IDFs than already existing circuits. This was done, apparently, to provide a clear interface for contractual purposes.

US "transmission level points"
INT "relative level points"

As mentioned elsewhere, there are unnecessary duplications of protection channels and different channel input and output levels. Different kinds of hardware are in use in the same station complicating maintenance and personnel training. INTS is being built by an international consortium of suppliers and is alleged to be three years late. This makes it difficult to match up today's circuit requirements with the original facility plans. I found no one who is forecasting long term circuit requirements on which a long range facility plan could be based.

Present microwave systems are being maintained by TCI while INTS is being maintained by GNPS under PMO supervision until it is finally accepted and turned over to TCI. In the meantime, DNC is keeping records and writing circuit orders. In some respects PMO and DNC collectively perform some of the functions of Long Lines, specifically the current facility planning work, implementation effort and circuit layout. Missing are the head-end parts of the overall circuit provision process - traffic forecasting, trunk forecasting and fundamental facility planning.

Over and over again we heard such statements as "a need for design of the transmission network", "want group to review traffic pattern and recommend national multiplex plan", "want AT&T to study transmission needs and advise TCI", "design of long distance is of URGENT CONCERN", "transmission network is not under control", "need overall entity for planning", "need long range planning and centralized planning". These came from all organizations - TCI, 2M56, PMO and DNC. The 2M56 executive director says his terms of reference aren't clear in the transmission area and he is constantly besieged by persons selling satellites. The cheif executive of TCI, however, believes he has responsibility for the design of the transmission network even though the work is actually being handled in other parts of the PTT.

In summary, while there may be a unified effort to expand the local networks to move from 0.5 million telephones now to 2 million in 1978 and 7 million in 1983, there is no unified program to provide the long distance network required for this station growth. The addition of several thousand additional cities to the network (project Vilcom) during the eight year period makes this problem even larger and more acute.

Project Vilcom and a Domestic Satellite System

Project Vilcom (previously Project Plowshare) is a governmental program to provide telecommunications services to 1000 villages by the end of the current five-year plan period (March, 1978) and an additional 2000 to 3000 villages within the subsequent five-year plan period. A village is defined as any community of less than 5000 population. Of the first group, 250 are assumed to be close

enough to existing facilities to be served by some conventional terrestrial means. It has been proposed that the remaining 750 be served by a domestic satellite system.

Several U.S. space firms have made domestic satellite system proposals - Hughes, RCA and Fairchild were mentioned by name, but I believe that Philco-Ford has also made a proposal. Apparently, only Hughes has made a reasonable proposal that is consistent with what the PTT people believe to be the need. In any case, only the Hughes proposal was made available to me and there was no evidence of holding back any useful information from any of us.

Under the Hughes proposal, two HS-333 satellites would be placed in geostationary orbit. These are Delta-launched, 12-channel, spin-stabilized satellites very similar to Westar and Telesat except for the antenna patterns. Small earth stations (5-meter antennas, 25 to 30 watt transmitters) would be prefabricated at a factory for shipment to each of the 750 villages. Medium-sized "gateway" earth stations (10.7 meter antennas, 3 kw transmitters) would be installed in six major cities (Ahwaz, Esfahan, Mashad, Shiraz, Tabriz and Tehran). The control facility would be collocated with the Tehran gateway terminal. Small earth stations, similar to but less expensive than the village stations, are proposed for TV reception at cities not served by the gateway stations.

The village stations would use demand assigned multiple access schemes to provide one to 12 (average 9) simultaneous trunks to the gateway locations for traffic completion within the switching area served by each of the cities. These village stations would also be equipped to receive four video channels and associated audio as well as some radio program material for education and entertainment. Some permanently-assigned trunks (96 or 192 trunks per link) would be available among the gateway stations to augment the microwave-derived trunks and to provide diversity within the network. Multiple satellite hops in a connection would be prevented except for a small amount of village-to-distant-village traffic and for overseas traffic originating or terminating in a village. These arrangements are, I believe, consistent with CCITT Recommendations.

The village circuits would utilize five of the satellite transponders, the video requirements would take four transponders and the gateway-to-gateway circuits would use the other three transponders in one of the satellites on a multiple carrier basis. The second satellite would be an in-orbit spare. As an added feature, Hughes has suggested that the military might add a third satellite in orbit to work with a network of military earth stations and that the two systems share the cost of the protection satellite.

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IRAN TRIP REPORT

Introduction

During the period of February 24 to March 1, 1975, a Bell System team visited Iran in an effort to determine what roles the Bell System might play in improving the telecommunications services in Iran. The team's principal purpose was to determine what items might be included in a Statement of Work to become part of any contract that might be negotiated between the AT&T Company and the Iranian PTT and its subsidiary organizations. A list of the team members is attached as Table I.

This memorandum will address one aspect of the team's investigation - intercity transmission. Other team members will address other aspects. The purpose of this memorandum is to provide information for anyone else who may be asked to participate in a Bell System effort in Iran.

Organizations Visited*

The team visited Iran at the request of the Minister of Posts, Telephone and Telegraph (PTT). While Messrs. Baird, Bright and Rickman met with the Minister, the other team members conducted their investigations within subsidiary organizations as follows:

1. Telecommunications Corporation of Iran (TCI)

   This is the "telephone company" with a corporate structure but without public stock and with its board composed of governmental ministers. TCI has been established as a profit-making entity but their management believes it more important that they provide a good telecommunications system to support Iran's growing industrialization. With the exception of a kick-off meeting which included the Chairman of the Board and Managing Director of TCI, Mr. Malek Abhari, and visits to operating locations, our contacts with TCI were through the 2M56 program office. The 2M56 designation is a short form for 2 Million telephones by the end of 1356 on the Iranian calendar.** This corresponds to the end of the current 5-year plan period and to March 21, 1978 on the Christian calendar. TCI's function is to provide local telephone service throughout the country and they believe their duties also include intercity transmission responsibility for telephone services and video. While they (TCI) are

*A partial list of people visited is attached as Table II.
**2M56 is budgeted at $2.5 Billion.

assuming maintenance responsibility for the intercity microwave systems, it is not clear that the planning of future systems is within their purview.

2. Program Management Office (PMO)

This is an organization reporting to a Director General of PTT and not a part of TCI. Its principle function is management of the Integrated National Telecommunications System (INTS) project. This project entails the construction of a nationwide microwave network, and some associated side legs, overlaying an existing smaller microwave network constructed under two or three earlier projects. In addition, PMO is laying out the multiplex sections required to meet the needs of the National Combined Circuit Requirements List (NCCRL). The "Combined" means TCI plus military needs, with each representing about half the total requirements. The system construction is nearing completion so that PMO effort is winding down.

3. Directorate of Network Control (DNC)

This organization issues Circuit Orders for the intercity circuit requirements and maintains all equipment records from 6-wire frame to 6-wire frame. They are also responsible for facility management in the intercity network. This organization reports directly to the Managing Director of Planning in the PTT. While not a part of PMO, it depends on PMO for support and for personnel. DNC is having installed at TCI's toll center in Tehran (the Sepah Square building) a centralized telemetry system to monitor conditions at every microwave station in the network*. It is not clear whether or not commands can be sent to the stations from this central location. As part of their facility management function, the people at DNC have prepared 779 pages of reroute and restoration plans covering every station in the network. They have also designed what they consider "idiot-proof" patching facilities to permit them to exercise these plans. Unfortunately, no funding has been available for installation of the patching facilities. (One exception is a supergroup restoration capability between Tehran and the international satellite earth station near Asadabad.)

Perhaps a list of the organizations not visited, but who are involved in intercity transmission matters should also be included. They are:

*In this telemetry system a steady light indicates a previously reported and acknowledged abnormal condition at a particular station. A flashing light indicates a change in state, i.e. a new alarm or clearance of an old one. Since such a few lamps were dark, one wondered if they weren't just burned out bulbs. This is unfair since the telemetry system hasn't been accepted yet.

1. Imperial Iranian Armed Forces (IIAF)

The military establishment used roughly one half of the assigned capacity of the intercity facilities. In addition, they operate some systems of their own. TCI tells us that the military operates systems in the 4 GHz band using frequency-hopping security techniques. The extent of the military systems is unknown. No contact was made with Philco-Ford who has a contract for some military communications facilities.

2. Iranian National Television (INTV) and Iranian National Radio

The broadcast people look to TCI for transmission facilities. It is alleged that INTV requested a very large increase in channel miles of video facilities. They also want four channels to villages not now served. For more on this see Project Vilcom below.

3. Iranian National Oil Company, Iranian National Gas Company and the Gas and Water Board

Each of these "right-of-way" organizations operates its own facilities, the extent of which is unknown.

4. Ministry of Agriculture

This Ministry apparently is the agency pressing for telecommunications facilities to rural villages. See Project Vilcom below for further information.

5. The Directorate in PTT responsible for Spectrum Management

A Mr. Hakimian has just been given this assignment. Spectrum management has been described as "non-existant" and "in chaos". Time did not permit a visit to Mr. Hakimian.

6. GNPS

This is the consortium of GTE-Italy, Nippon Electric, Page Communications Engineers, and Siemens who are building INTS. Their image is badly tarnished, but we did not hear their side of the story.

7. The State Police

The police are considering construction of a data network separate from the TCI network to meet their own needs and as a common carrier for other users.

Present Iranian Intercity Network

Figure 1, attached, shows the equipped capacity of the Iranian intercity broadband network upon completion of the present construction effort on the Integrated National Telecommunications System (INTS). In addition to INTS, the network comprises facilities provided in connection with earlier projects known as CENTO, "7-links" and "3-1". The physical routing and radio repeater stations are shown on Figure 2. A highway map is also attached as Figure 3. Comparison of the facilities map with the highway map shows that the country does have broadband facilities interconnecting all major cities, generally with multiple route capability. (The large area not served is desert.)

The broadband network is provided via radio relay systems generally in the 6 GHz band. Some use is made of the "Upper 6" band (6425-7250 GHz) and the old CENTO route utilizes the 2 GHz band. A 120 channel troposcatter system operating near 2 GHz is used to cross the mountains east of Ahwaz. VHF and UHF radio, as well as a few short VF cables, are used to serve military and civilian terminals as side legs from the major routes as shown on Figure 2. Additionally, several manual exchanges are connected to nearby cities via open wire lines. The size and number of these installations were not investigated.

The network provides a high degree of video connectivity. Video service is available in both directions between Tehran and all provincial capitals, usually on dedicated radio channels, but in a few cases by a combination of dedicated and protection channels. Additional cities can also be served through the use of protection channels as well as the dedicated video facilities.

The Figures give the impression that the radio systems might be expandable to care for Iran's intercity needs for some time to come. Unfortunately, the potential for expansion may be rather limited by past engineering decisions. Due to capital budget limitations existing when the present systems were planned, frequency plans were adopted which required only a single antenna at a station for transmission and reception on a given path and the towers were sized accordingly. It is feared that those towers would not support the additional antennas required to expand the routes to the full capacity. (Indeed, consultants are now reviewing tower strengths and loads and it is feared that some may already be overloaded.)

There are some ineffeciencies existing that could be removed to increase the circuit carrying capacity of the routes. For instance, 600-channel and 960-channel equipment could be replaced by 1800 channel equipment. Each project was built with its own 1x1 or 1x2 protection scheme so that some routes have two protection channels where one would be adequate. By using the protection channel suitable for the highest channel capacity and multi-line switching, an additional message or TV channel could be made available within the present frequency plan. Replacement of all present FM equipment with single sideband equipment could also materially increase the circuit capacity of present land, buildings, antennas, frequency assignments, etc. More extensive use of "round robin" techniques could add to the video capability of the present network. Use of other frequency bands (e.g., 4 GHz wherever no conflict exists with other users) could be useful in expanding both video and message capability of existing routes.

A much more detailed investigation into the limitations and possibilities of the existing network than could be made in the few days spent on this visit is required before specific recommendations can be made for expansion. And the first requirement for any recommendation would be some estimate of future circuit requirements and a long range facility plan to satisfy those requirements.

Facility Planning

By their own admission, the Iranians badly need a fundamental facility plan and some super agency to coordinate the activities of the several organizations in the PTT. This is an area in which they think AT&T could be very helpful to them.

In preparing their transmission facility specifications they rely completely on CCITT/CCIR Recommendations. If there is a transmission plan it isn't known to all organizations. They have interface problems such as some systems operating at +7, -16 dBm levels and others at +4, -13 dBm. All trunks are one-way operation. All of the technical matters could rather easily be standarized, but the most important gap is the absence of a long range plan and an organization to produce one.

Someone, I don't know who, decided several years ago to build the microwave network of the INTS project. This network was overlaid on the existing network without adequate integration of the two, its seems to me. For instance, the circuits of INTS terminate on different IDFs than already existing circuits. This was done, apparently, to provide a clear interface for contractual purposes.

US "transmission level points"
INT "relative level points"

As mentioned elsewhere, there are unnecessary duplications of protection channels and different channel input and output levels. Different kinds of hardware are in use in the same station complicating maintenance and personnel training. INTS is being built by an international consortium of suppliers and is alleged to be three years late. This makes it difficult to match up today's circuit requirements with the original facility plans. I found no one who is forecasting long term circuit requirements on which a long range facility plan could be based.

Present microwave systems are being maintained by TCI while INTS is being maintained by GNPS under PMO supervision until it is finally accepted and turned over to TCI. In the meantime, DNC is keeping records and writing circuit orders. In some respects PMO and DNC collectively perform some of the functions of Long Lines, specifically the current facility planning work, implementation effort and circuit layout. Missing are the head-end parts of the overall circuit provision process - traffic forecasting, trunk forecasting and fundamental facility planning.

Over and over again we heard such statements as "a need for design of the transmission network", "want group to review traffic pattern and recommend national multiplex plan", "want AT&T to study transmission needs and advise TCI", "design of long distance is of URGENT CONCERN", "transmission network is not under control", "need overall entity for planning", "need long range planning and centralized planning". These came from all organizations - TCI, 2M56, PMO and DNC. The 2M56 executive director says his terms of reference aren't clear in the transmission area and he is constantly besieged by persons selling satellites. The cheif executive of TCI, however, believes he has responsibility for the design of the transmission network even though the work is actually being handled in other parts of the PTT.

In summary, while there may be a unified effort to expand the local networks to move from 0.5 million telephones now to 2 million in 1978 and 7 million in 1983, there is no unified program to provide the long distance network required for this station growth. The addition of several thousand additional cities to the network (project Vilcom) during the eight year period makes this problem even larger and more acute.

Project Vilcom and a Domestic Satellite System

Project Vilcom (previously Project Plowshare) is a governmental program to provide telecommunications services to 1000 villages by the end of the current five-year plan period (March, 1978) and an additional 2000 to 3000 villages within the subsequent five-year plan period. A village is defined as any community of less than 5000 population. Of the first group, 250 are assumed to be close

enough to existing facilities to be served by some conventional terrestrial means. It has been proposed that the remaining 750 be served by a domestic satellite system.

Several U.S. space firms have made domestic satellite system proposals - Hughes, RCA and Fairchild were mentioned by name, but I believe that Philco-Ford has also made a proposal. Apparently, only Hughes has made a reasonable proposal that is consistent with what the PTT people believe to be the need. In any case, only the Hughes proposal was made available to me and there was no evidence of holding back any useful information from any of us.

Under the Hughes proposal, two HS-333 satellites would be placed in geostationary orbit. These are Delta-launched, 12-channel, spin-stabilized satellites very similar to Westar and Telesat except for the antenna patterns. Small earth stations (5-meter antennas, 25 to 30 watt transmitters) would be prefabricated at a factory for shipment to each of the 750 villages. Medium-sized "gateway" earth stations (10.7 meter antennas, 3 kw transmitters) would be installed in six major cities (Ahwaz, Esfahan, Mashad, Shiraz, Tabriz and Tehran). The control facility would be collocated with the Tehran gateway terminal. Small earth stations, similar to but less expensive than the village stations, are proposed for TV reception at cities not served by the gateway stations.

The village stations would use demand assigned multiple access schemes to provide one to 12 (average 9) simultaneous trunks to the gateway locations for traffic completion within the switching area served by each of the cities. These village stations would also be equipped to receive four video channels and associated audio as well as some radio program material for education and entertainment. Some permanently-assigned trunks (96 or 192 trunks per link) would be available among the gateway stations to augment the microwave-derived trunks and to provide diversity within the network. Multiple satellite hops in a connection would be prevented except for a small amount of village-to-distant-village traffic and for overseas traffic originating or terminating in a village. These arrangements are, I believe, consistent with CCITT Recommendations.

The village circuits would utilize five of the satellite transponders, the video requirements would take four transponders and the gateway-to-gateway circuits would use the other three transponders in one of the satellites on a multiple carrier basis. The second satellite would be an in-orbit spare. As an added feature, Hughes has suggested that the military might add a third satellite in orbit to work with a network of military earth stations and that the two systems share the cost of the protection satellite.

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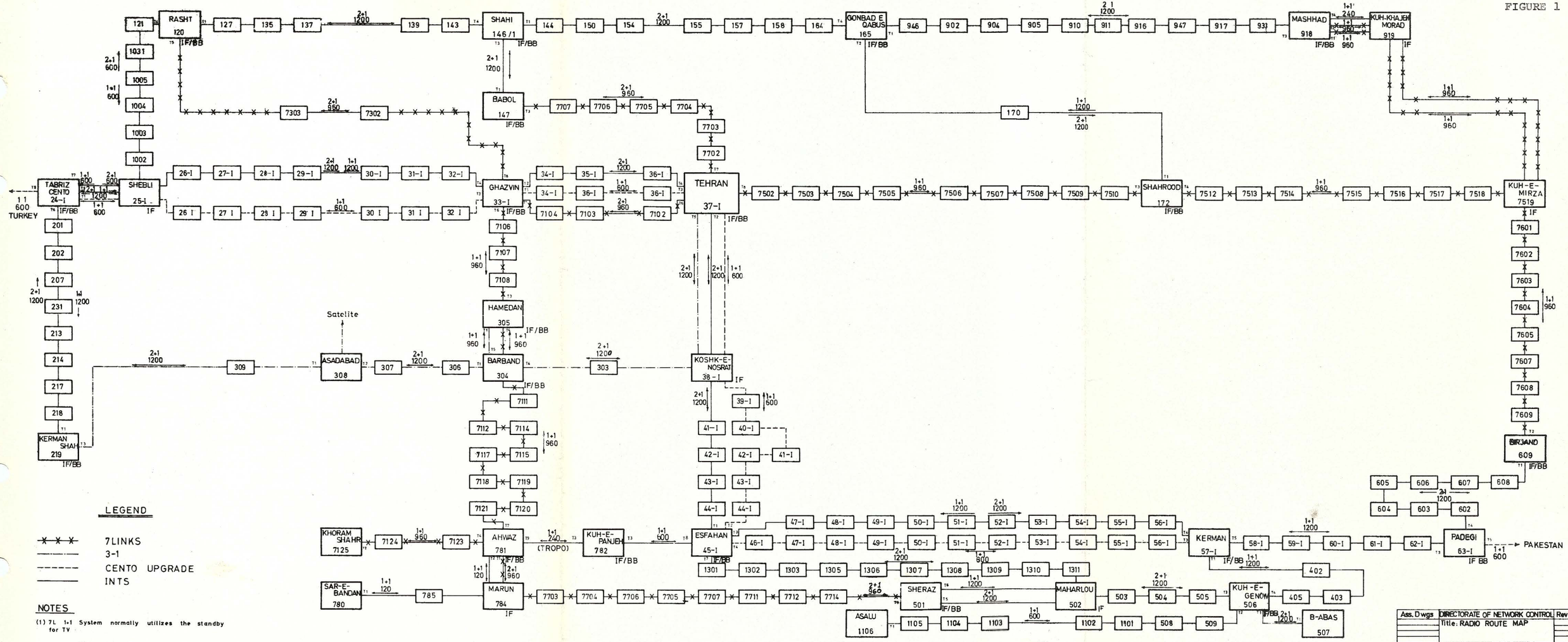
FIGURE 1



LEGEND

- 7LINKS
- 3-1
- CENTO UPGRADE
- INTS

NOTES

(1) 7L 1+1 System normally utilizes the standby for TV

Ass. Dwgs	DIRECTORATE OF NETWORK CONTROL	Revised
	Title: RADIO ROUTE MAP	
	Drwn by: ESMAEILI Date 1 NOV 73	
	Aprd by: [illegible] Dwg No: 16.2.3-1	

FIGURE 2

U.S.S.R.

U S S R

TURKEY

IRAQ

KUWAIT

NEUTRAL ZONE

NEUTRAL ZONE

SAUDI ARABIA

CASPIAN SEA

PERSIAN GULF

FARSY

KUSHK-E-NOSRAT 302, 38-1

ABU MUSA

TUMB

FAROUR

MASQAT AND OMMAN

OMMAN SEA

AFGHANISTAN

PAKISTAN

TO KARACHI

CENTO

T1

T2

T3-2

T4

T5

T6

T7b

T7c

T7d

T7e

T9

T10

T11

T13

R1

R2

R3

R4

R5

R6

R7

T14a

T14b

T14c

T14-E

LEGEND:

- CENTO EXPANSION ROUTE
- CENTO REHABILITATION ROUTE
- HD/MD MAIN ROUTE
- MD/LD MW ROUTE
- UHF
- VHF
- CABLE
- TERMINAL
- ONE-WAY DROP REPEATER
- TWO-WAY DROP REPEATER
- THROUGH REPEATER
- BASEBAND SPLITTING REPEATER
- TERMINAL REPEATER
- FLAT PASSIVE REFLECTOR
- PARABOLIC PASSIVE REPEATER
- MULTI-JUNCTION STATION
- R1 ROUTE 1 SEVEN LINKS
- T1 TASK 1 INTS

TEHRAN LEASED LINES

REV.	DATE	DESCRIPTION	BY	CHKD	APPR
C	23/4/74	7-LINKS SITE NUMBERS REVISED ACCORDING TO ENGINEER S93 REV.4, 15 APRIL 1974. CCN-228/3, CHANGE SITE NAMES TO NEKA TCI(1176), HARIRUD TCI(1150). CCN-228/2, RECONFIGURE CABLE ROUTE 48-1-S1,48-1-S2. CCN-286/1, DELETE LINK 171008, ADD LINK 171006. CCN-228/5, ADD CABLE LINKS 1717-1717A, 1717-1717B, 55-1-S1-55-1-S2. CCN-228/7, RECONFIGURE CABLE AT SITES 125,141,180,250. CCN-313, RECONFIGURE SITES 735/1, 735/2. CCN-310, ADD SITE 734/3. GWPS-OPS-1-2857/75, CABLE ROUTE 250-251/1-250.	J.O.	J.O.	J.O.
B	8JAN75	TASK TEHRAN ROUTE LAYOUT CHANGED. MISC-SITE SYMBOL CORRECTIONS. C-00281 ADD CABLE 171618, DELETE 171617. BC-00279 ADD CABLE 175017, DELETE 175001. A-00280 ADD SITE 168/1, DELETE 144, 145. C-00231 ADD CABLE 14502, DELETE 14549. C-00230 ADD CABLE 55-S-S1 - 55-1-S2. ABCD-00228 REV.2 - ADD LINK, 12879, 50774, 82828, 198079, 21683/1 DELETE LINK 91825, 157173, 21683. CHANGE SITE NAME TO NAIN TCI(48-1-S1), BAM TCI(60-1-S1), AMOL TCI(165).	J.O.	J.O.	J.O.
A	9JAN75	INCLUDE 7-LINKS CABLE TAILS & CORRECTIONS.	J.O.		

INTS / CENTO / 7- LINKS COMMUNICATIONS NETWORK

DWG. NO	ENGINEER J.O.	DRAWN V.I-K	CHECKER
623	M.S.D. K.H.	APPROVED	DATE 6-NOV.1974
	FIGURE		SHEET 1 OF 1

FIGURE 3


U. S. S. R.
CASPIAN SEA
IRAQ
KUWAIT
NEUTRAL ZONE
SAUDI ARABIA
NEUTRAL ZONE
PERSIAN GULF
QATAR
MASQAT
OMAN SEA
AFGHANISTAN
PAKISTAN
Rasht
Zanjan
Mahmud Abad
Farahabad
Gomishan
Bojnurd
Quchan
Kalat-i-Naderi
Mashhad
Sari
Amol
Damghan
Shahrud
Torbat-e-Heydariyeh
Gonabad
Kakhk
Ferdows
Deyhuk
Kashan
Qom
Arak
Saveh
Qazvin
Zanjan
Abhar
Mianeh
Tabriz
Maragheh
Miandoab
Mahabad
Takab
Sanandaj
Marivan
Saqqez
Oshnaviyeh
Malayer
Borujerd
Nahavand
Hamadan
Shahabad
Kermanshah
Ilam
Dezful
Ahvaz
Abadan
Bandar Shahpur
Khorramshahr
Shiraz
Ardakan
Yazd
Bafq
Zarand
Rafsanjan
Kerman
Saif Abad
Hasan Abad
Dara
Jahrom
Bandar-e-Bushire
Bandar-e-Lengeh
Kahnuj
Bandar-e-Abbas
Minab
Bandar-e-Charak
Zahedan
Khash
Chahbar
RAILWAY AND MAJOR ROAD
RAILWAY

G. SPIRO

Bell Laboratories

subject: Visit to Iran February 24 to March 1, 1975

date: March 26, 1975

from: G. Spiro

TRIP REPORT

A Bell System team (see Attachment 1) visited Iran and between February 24 and March 1, 1975, discussed with the Ministry of Posts, Telegraph and Telephone (PT&T) possible Bell System technical assistance in the development of their national telecommunications system. The discussions consisted of meetings with various government officials in the PT&T and consultative groups working for PT&T. Visits were also made to central offices and operating centers.

People on the Bell System team focused on different areas of interest. Attachment 2 shows the assigned areas of technical interest. In addition to the technical areas, Messrs. Baird, Bright, and Rickman met with the Minister of PT&T, members of the American Embassy, and other American firms doing business in Iran. I will report on items of concern primarily with the technical aspects of switching, loop plant, signalling, station arrangements, and customer services.

On Monday morning, February 24, 1975, the whole Bell System team met with the following PT&T people associated with the Telecommunication Company of Iran (TCI): Mr. Iliffe, Program Director for 2M56 and Messrs. Vojdani and Larsson, Co-Directors of Systems Engineering for 2M56. Mr. Malek-Abhari, Chairman of the Board and Managing Director TCI joined the meeting later.

Mr. Iliffe outlined the objectives of the 2M56 (2 Million by 1356) Program. The goal is to grow from about 500,000 dial subscriber lines now to two million dial subscriber lines by the Iranian year 1356 (March 21, 1978). He stated that the engineering and provisioning of equipment was well in hand on this program. He said that the real problems that they face are with the present operating system because of lack of good, skilled, motivated people, under proper supervision, to operate, maintain, and integrate the growth.

Mr. Iliffe reported progress to date on the 2M56 Program. An office building to house up to 500 people has been leased in Tehran. Consultants have been or will soon be hired to advise on switching, outside plant, traffic design, buildings, etc. TCI has a problem in recruiting and keeping good senior staff members because of their low civil service salaries. They want to train Iranians to be capable of taking over all jobs. Therefore, all expatriate consultant groups operate with Iranian TCI employed counterparts.

Attachment 3 outlines the statistics and broad objectives of the 2M56 Program. It also lists the TCI dial exchanges in Tehran, other cities, and provinces.

When Mr. Malek-Abhari joined the meeting, he also covered the 2M56 Program objectives. He said that they are currently selecting a consultant on manpower management.

Mr. Malek-Abhari reported that the Japanese consultants are designing for the local cable plant growth and outside plant rehabilitation program. An immediate need is to select 800 to 1,000 central office locations in order to coordinate new building construction and cable plant expansion.

TCI wants a consultant group to review the network traffic plan, develop a national multiplex plan, design a management information system, and generate line management practices.

During further discussion we learned that Iranian residences and businesses are usually pre-wired and the customer installs the telephone given to him by TCI. Additional extensions can be bought outside in privately operated retail stores. No party-line service is offered. However, because of the shortage of lines and the backlog of held orders, customers bridge other people on their lines.

The network has a 4-level hierarchy and TCI wants an improved routing plan to take advantage of electronic switching. I learned later that Tehran has essentially all step-by-step dial switching equipment. It is laid out as we conventionally do with tiers or rings of offices with first digits 2, 4, 6, 7, 8, 9 used to route calls via digit resolving tandems. The numbering plan may be subject to change.

The charging plan will be converted to toll ticketing (AMA) but pulse metering will be retained for local service.

Mr. Abhari reviewed Iranian national objectives regarding telecommunications. They view the modernization program not in terms of return on capital but as a contribution to the national economy. For example, road building, rural electrification, and telephone all have equal priorities.

TCI has 15,000 employees and they are trying to add 7,000 to 8,000 more. The present organizational structure is functional, i.e., financial, operations, technical. They want to change this and they plan to divide the country into 4 or 5 regions. This "modular" structure will permit the delegation of authority down the line to run the day-to-day job. They also plan to set up service divisions for purchasing, personnel, etc. The plan to do this has been developed. It is proposed that within the next year one such region will be established as a pilot project.

On the 2M56 Program, Mr. Malek-Abhari said that TCI wants AT&T to provide professional advisors to serve as super-consultants over their other consultants, i.e., SOFRECOM (Society of French Communications), SWEDETEL, NTC (Nippon Telecommunications Consulting Company). There is a need for planning beyond 1978 and they want a coordinated look to up-date the national routing, traffic, and multiplex plans based on sound engineering principles.

There are 70,000 villages (defined as less than 5,000 population) in Iran that do not have telephone service. The 2M56 Program's aim is to bring telephone service to about 750 such locations, half of which are expected to be new towns. These locations will require about 12 trunks each to join the network over distances of up to 70 to 100 kilometers.

We learned that local calls, including coin, are untimed and they cost 2 Rials (about $.03). Telephone service costs 300 Rials (about $4.50) per month which includes a message unit allowance. A new subscriber for telephone service has to put up 20,000 Rials (about $300). However, there is a held order list of about 160,000 subscribers who have put up such deposits. This kind of backlog for service generates a black market in the sale of telephone service. When a customer moves, he leaves his telephone service behind and he sells it to the new occupant.

Pulse metering is used for toll service with variable time intervals, based on distance.

There do not appear to be service measurements or statistics on subscriber complaint reports, service indices, traffic measurements, etc.

There is a large turnover of competent Iranians because a skilled, capable manager or engineer can get triple or quadruple wages working for the oil, gas, or electric industries. Later, during our tours, several Iranian engineers escorting us around asked me about job opportunities for them in America.

PABXs are furnished and owned by the subscriber.

Public coin telephones are available for only local service at 2 Rials per call untimed. They have ordered a new coin station for toll calling which will employ magazine loading of coins. A 16 Khz signal will be used to control coin collect over the station loop. Coins will be collected based on time and distance.

There is a one message unit (2 Rial) charge for information service. Directories are not published often. I could not find one. They plan to publish an English language version with yellow pages.

The only Special operator calls are collect via the toll operator.

There is no public mobile radio service.

Tehran needs sewers, subways, piped gas, buried telephone and power cables, etc.

In response to my question, Mr. Malek-Abhari said that we could not photograph any of the places or equipment we were to visit or see. He did not elaborate on why not or offer any conditional restrictions.

On Tuesday, February 25, 1975, part of the Bell System team (members listed on Attachment 2) visited the 2M56 Program office building and we met with Mr. Iliffe. He gave us copies of 23 position papers covering all open-issue aspects of the 2M56 Program. These position papers were examined and Mr. J. A. McCarthy has copies for reference purposes.

Mr. Iliffe said that the best buy on the market for a dial telephone was about $9 for a Roumanian instrument. The subscriber loops have many bridged extensions including

other bootleg subscribers. This practice results in poor transmission and dialing performance. Trouble detection is difficult.

Mr. Iliffe gave us some insight into the beginnings of the 2M56 Program. He reported that about six years ago the Prime Minister of Iran visited Spain. There he made comparisons on various items since Iran and Spain have similar populations. He discovered that Spain had about 15 times more dial lines than Iran. The Shah of Iran on learning of this declared that Iran should have an equal number. This stimulated a series of five-year plans aimed at that objective.

Planning for the 2M56 Program, which is primarily the provisioning of equipment and not operations, was scheduled from the end date backward. Therefore, it is a very tight program and it is critically dependent upon fitting in and working with the existing environment.

We discussed with Mr. Iliffe the various interests of the Bell System team members and our desire to visit central offices and operating centers. This was arranged for us and will be reported on subsequently.

I was introduced to the SOFRECOM managers, Messrs. Tagliavini and Lacout. We discussed the kind of switching equipment in the existing plant. This is primarily Siemens EMD (Edelmetall-Motor-Drehwaher) a noble metal contact, motor driven, uni-selector, direct progressive control system. It is manufactured by the Iranian Telecommunications Company (ITC) in Shiraz which is jointly owned by Siemens and TCI. ITC is currently producing about 120,000 lines of EMD equipment per year. SOFRECOM has to decide how to use this equipment for growth on existing exchanges or for new exchanges as part of the 2M56 Program.

There is subscriber toll dialing between 40 cities and this is to be expanded to 58 cities with an open-ended numbering plan. 2M56 will retain this plan. Tehran now uses a six-digit dialing plan and will go to seven digits later. This has not been scheduled. On toll dialing there is a six second delay and timeout to signal end of dialing.

The national network hierarchy consists of 4 levels including the end offices. The top level is the CX or Central Exchange. There are now five such offices and in the 2M56 Program there will be six. The next level down in the hierarchy is the MX or Main Exchange. Below that is the NX or Nodal Exchange.

There are a total of 53 MX and NX exchanges now with about 250 planned in the 2M56 Program. The MX and NX exchanges are register-sender systems. The CX, MX and NX exchanges are 4-wire systems. The end offices are LX, or Local Exchanges. There are 40 dial exchanges in Tehran and 56 dial exchanges in other cities and towns. There are also 250 manual exchanges in the provinces. The 2M56 Program expects to have about 750 LX Exchanges.

The EMD dial exchanges have all been installed since the 1950's, mostly in the 1960's. Also included are two Strowger-type step-by-step exchanges of 10,000 lines each in Tehran. These were installed by the General Electric Company of England about 28 years ago. Growth on existing EMD machines will stop at 10,000 line units. There are no current plans to replace the EMD equipment.

Pulse metering is provided based on time and distance. Meters (message registers) are located in the central office only. TCI has ordered a system for pulsing at 16 Khz over the subscriber loop for station meters. The electronic systems for the 2M56 Program, which are expected to be GTEI (General Telephone and Electronic International) No. 1 EAX will have local AMA. Toll ticketing will be introduced into EMD offices via ANI and CAMA.

There are no specified requirements for data transmission.

We discussed subscriber loop ranges. EMD serves loops of about 1,000 ohms excluding the station set. EMD uses 60 volts on the line circuit and the station sets generally used in Iran require 30 milliamps. Stations are now dial pulse and EMD offices will not be converted to handle TOUCH-TONE. The electronic offices will provide TOUCH-TONE calling.

For interoffice signalling, EMD uses dial pulse with compelled supervision based on the European system. The electronic offices will use North American conventional 2/6 multi-frequency with reversed battery supervision. However, an electronic office working with EMD will have to adapt to the EMD mode of dial pulsing and compelled supervision. The specified requirement is that the new system must match the old.

The SOFRECOM people turned over to me the specification that they prepared for TCI covering the switching network and switching system requirements. This was issued in June, 1973, and it took about 6 months of effort by a SOFRECOM team.

They would not divulge the price paid by TCI for the specification or the total effort required to produce it. I have the two volumes of the specification of technical interest. It is fairly comprehensive. It includes statistical information on the current network, the numbering plan, and the program for 2M56. The specification was written to meet international switching standards because in 1973 Iran thought that they might have to turn to the World Bank for loans to finance their growth and modernization program. The World Bank requires that any supplier could bid on a proposed contract. Therefore, the requirements are stated in generic terms independent of electromechanical or electronic switching system implementation. I understand that bids were received from Siemens, L. M. Ericsson, IT&T Belgium, GT&E International, and NEC (Nippon Electric Corporation). SOFRECOM examined the bids. After study, SOFRECOM and TCI have just about accepted the GTEI proposal for using the No. 1 EAX and XP-100 and XP-1000 systems to implement the switching part of the 2M56 Program. Contracts to be signed with GTEI will include the setting up of a factory in Iran (probably to be located in Shiraz) to manufacture electronic switching equipment. Plans call for gradual manufacturing buildup starting with about 100,000 lines in the first year, 350,000 lines in the second year, and 500,000 lines thereafter. The plant is to be owned 40 percent by GTEI, 30 percent by TCI, and 30 percent by the Iranian Bank for Industrial Development. I learned later that this plant might build up to 1 million lines per year to meet Iran's needs and perhaps export.

An interesting sidelight occurred during discussions at 2M56. In reviewing the GTEI proposals for electronic switching systems, it was noted by TCI that the electronic systems were more expensive than the electromechanical systems that had been proposed by Siemens and NEC. The GTEI people were asked to explain the differences and they did so by discussing the savings for maintenance, floor space, power, future flexibility, new features and services, etc. The GTEI people were asked by TCI to quantify the advantages of electronic over electromechanical switching and they responded by quoting FCC testimony of Mr. Frank S. Vigilante of BTL on the value of ESS!

That same day I met with Mr. Tourzan (PhD at UCLA) who is the Iranian Co-Director of the 2M56 Program. He said that he is looking forward to Bell System participation in the 2M56 Program. He admires American go-get-it characteristics and he feels that is what is needed to oversee the other

consultants, run the system afterwards, and train Iranians to take over. He would like the Bell System to participate in the long range planning for several of the on-going five-year plans. He wants switching experts to evaluate proposals and to review test and acceptance procedures and provision of services and to interpret the impact on the current system and management of it.

Mr. Tourzan told us that TCI Iranian technicians install the Siemen's EMD switching equipment. GTEI will install their electronic switching systems and operate them for two years but they will train and use Iranians during the second year. He would like to set up a separate, independent R&D software company. He knows that present TCI civil service pay scales will make it difficult to retain highly trained technicians. His plan is to call on this proposed R&D software company as a centralized body or source of electronic management people for technical services.

On Wednesday, February 26, 1975, I visited several central offices. At the BOULVARD Exchange, we saw a newly installed 10,000 line EMD local exchange. It was within 10 days of being cut into service. It had been installed by TCI Iranian technicians. This was a crash program completed in 6 months. They told us that the normal installation interval for an office of this kind and size is 9 months. In appearance the installation was clean and neat with good wiring and soldered connections. They told us that the maintenance crew for an office of this kind and size would be two in the morning, one in the afternoon, and one at night. We saw the cable vault which has a capacity to serve up to 30,000 lines. The main distributing frame looked clean and we saw a new plastic solderless connecting block. We toured the power room.

We also saw their pulse metering message registers. These are read and recorded by hand once a month. They are planning to take pictures of the meters in the future.

We also visited the ZOFAR Exchange which is under construction and will have 10,000 lines of EMD plus a transit exchange. We were adversely impressed by the new building for its hazardous condition. No hard hats were worn and loose materials such as packing crates, building materials, etc., were strewn all around.

We visited the DANESHGAH Exchange which has a 28-year old, 20,000 line Strowger SXS system. They have a 4-position repair service bureau. The old main distributing frame looked fairly clean and in good shape. The old equipment looked operational and well maintained.

We also saw their new coin station set for toll calling which has an LED display of coins remaining in the magazine. During our visit at the coin box repair bureau we were told that coin boxes are collected about once a week. They used to pay a 15 percent commission to storekeepers but most coin stations have been moved outside. There are about 1600 coin stations in Tehran.

We visited an information (directory assistance) center in EKBATAN which serves all of Tehran. We saw the preparation of microfilm lists which are updated every 15 days. We saw the new information center where a Pentaconta ACD will distribute calls to 90 positions in 4 supervisory groups.

On Thursday, February 27, 1975, I returned to 2M56 to review the GTEI proposal for the development of the Iranian telephone switching network. This proposal was submitted on July 7, 1974, to TCI by letter from Mr. Robert Sanders, Vice President of GTEI, Stamford, Connecticut. (Attachment 4 - letter only). During the day I was able to review only part of the bid by GTEI. For reference, Attachment 5 is an outline of the technical portion covered in eight volumes submitted by GTEI. I was able to review mainly Volumes B1, B2 and B4 as these appear to outline the essential technical elements of the GTEI proposal.

The proposal by GTEI can be summarized as follows:

1. No. 1 EAX (and its family of smaller machines) is offered for local, local tandem, and transit exchanges either 2-wire or 4-wire.

2. Some lines will be imported initially but the proposal includes plans for joint venture manufacturing with a build-up to about 500,000* lines per year or more. The excess beyond Iran's needs could result in export

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* This differs from GTEI's transmittal letter (Attachment 4) and it reflects information given to me by TCI people. A number of items in the original proposal were changed via negotiation.

sales. GTEI's Worldwide International Marketing Organization would assist in the export market.

3. A comprehensive staff training program in the U.S. and Iran for TCI and joint venture manufacturing personnel. Training centers to be established in Iran by GTEI.

4. Complete compatibility with EMD plus network enhancement by tandem switching and CAMA for the EMD exchanges.

5. No. 1 EAX with full benefits of future product and system evolution. (Compared with EMD, Crossbar, etc., as obsolecent).

The No. 1 EAX hardware was described as:

- Sealed reed switch (network is multistage, space division, analog*).
- SIC packs with TTL logic.
- MSI functional circuits.
- LSI-MOS memory.
- Thick film active and passive networks.
- Computer components (hardware, teletype, magnetic tape, etc.).

No. 1 EAX system characteristics were described as:

- Heavy traffic including tandem up to 20,000 subscribers.
- End office, light traffic, up to 40,000 subscribers.
- Traffic capacity: 7,000 erlangs and 100,000 peak BHC attempts.

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* GTEI said they are developing a time-division digital switch for trunk and transit exchanges.

- LAMA, CAMA, message rate service.
- Subscriber loop circuits 2250 ohms including telephone sets at 23 milliamps. If station set requires 30 milliamps, this range is reduced to 1500 ohms.
- Expandable in 200 line increments.
- Compatible with EMD.

System maintainability via centralized system control, status display consoles, automatic trouble analysis, automatic equipment routining, spare parts, printouts on teletype, test devices, internal diagnostic programs, remote maintenance via teletype (up to 6 teletypes can be remoted).

No. 2 EAX for large centrex applications.

For smaller exchanges, generally below 3,000 lines, GTEI proposes the following systems:

The XP-1000 system which is wired logic with decentralized common control (building block markers and registers). Currently, this system is manufactured in Milan, Italy and it could be manufactured in Iran since it uses similar components as No. 1 EAX. This system is generally applicable below 3,000 lines but can grow to 20,000 lines.

The XP-100 system is similar to the XP-1000 system but it is intended to be economic down to 100 lines. Routing translation and billing are controlled from a central exchange which they say could be No. 1 EAX, XP-1000, or an EMD LX or TX office. The first unit of XP-100 could grow to 600 lines and 2 units could grow to 1,000 lines.

On February 27, and March 1, 1975, I had several private conversations with Mr. Iliffe. He is concerned about the poor condition of the existing TCI plant and its ability to function successfully in the future with the 2M56 Program. He feels that AT&T should get into the operation and administration of the current network. We discussed his concerns and the possible reasons why the 2M56 Program might fail. We touched on the problems of supply and the ability of the contractors to meet their implementation schedules. We talked about installation, test, and acceptance of all of the elements, including buildings, switching, outside plant, etc. We talked about the people problem and the need for training, cooperation, motivation,

and the breaking down of barriers between organizations, etc. We talked about the condition of the existing plant and Mr. Iliffe's concern for how his 2M56 Program will interface and integrate with it.

I met later on March 1, 1975, with Mr. Tourzan and he reviewed with me the structure of his organization which can be outlined as follows:

The 2M56 Program has a project directorate made up of Mr. Tourzan (Iranian) and Mr. Iliffe (expatriate) as Co-Directors. They have responsibility for three areas: Systems Engineering, with Co-Directors Messrs. Vojdani (Iranian) and Larsson (Swedish), Finance with Coopers and Lybrand (American) as consultants. The Finance section includes 12 people now and will peak at 40 total including Iranians and expatriates in equal numbers. An Installation Test and Acceptance section with Co-Directors Messrs. Afjei (Iranian) and Loren (Swedish).

In the Systems Engineering section there are four consultant groups as follows:

1. Switching - SOFRECOM with 7 people now and 14 at peak. These are all expatriates with an equal number of Iranians to be included.

2. Cable - SWEDETEL with 6 people now and 100 at peak; expatriates only with an equal number of Iranians to be trained. SWEDETEL is responsible for the cable plant outside Tehran and the specifications for national standards.

   NTC - 16 now and 70 peak. These are expatriates only with an equivalent number of Iranians to be trained.

3. Power - considering as consultants SOFRECOM, Cable and Wireless, or Bell Canada.

4. Building - Cable and Wireless and an Iranian firm have been hired as building consultants.

At the appropriate time, the Systems Engineering consulting groups: Switching, Cable, Power, and Building will shift their operations to function under the Installation Test and Acceptance section.

I turned over to Messrs. Tourzan and Iliffe two copies of a volume of writeups on Bell System No. 1, 2, 3 ESS, TSPS No. 1, and loop electronics. These volumes had been prepared for this purpose by Mr. Warren Corgan, Western Electric Company, General Manager, Pricing and Service Consulting, and his people. The purpose in giving TCI this material was for reference only. It contained only descriptive material that was not considered to be proprietary and it did not include prices.

On March 1, 1975, I also met with the NTC consultants working on the 2M56 Program cable plant for Tehran. The conference included Mr. Vojdani and Mr. Sano of NTC, and Mr. Harris. They told us that the 2M56 Program is designing outside plant capacity to cover the 2M56 Program plus 20 years. The SWEDETEL group is responsible for cable facilities outside Tehran and to design the national cable standards.

NTC is currently surveying the existing plant and formulating requirements and designing specifications for rehabilitation and growth. They gave me a slightly different manpower number than Mr. Tourzan had given me earlier. They said they will peak at 80 (not 70) plus an equal number of Iranians. They have four Iranian technicians working with them at this time.

TCI will continue to furnish the drop wire to the house and the customer will provide his own inside wiring. This may change in the future with TCI doing the total job.

We discussed loop ranges. They said that EMD requires maximum 1200 ohm loops not including the station set. The No. 1 EAX has a loop range of 2250 ohms not including the telephone. This range will be reduced to 1500 ohms if the station set requires 30 milliamps.

The cable rehabilitation program calls for a survey of the condition of cables, vaults, ducts, terminals, main distributing frames, manholes, and drop wires. They are scheduling for 24 months completion on a phased basis. They showed us photographs of typical manholes in Tehran. These were in terrible shape. Cables were not neatly racked. We could see dead-ended cut cables and sneak wires. They were concerned about these conditions and recognized that they faced an extensive rehabilitation program.

They have written to nine organizations in Tehran including water, gas, and electric to consider a cooperative effort on sharing a two-meter utility tunnel in Tehran. So far, there has been no response from the other utilities.

They plan to pressurize main distribution cable and use jelly filled cable for branch distribution. They would like to put in a sophisticated pressure monitoring and alarm system. Some of their cable is now pressurized but apparently not monitored.

They will use 26 gauge wire for EAX and 22 gauge wire for EMD lines.

The present arrangement for cable joining is dry twisted for local distribution. For data lines, soldered connections are required. They plan to solder connections on 100 pairs in each cable. Connectors will be considered.

The type of cable covering has not been selected yet. They will probably import cable from General Cable and L. M. Ericsson. An Iranian cable manufacturing plant will probably be built in the future.

They plan to use copper and have not considered use of aluminum wire.

They plan to use PVC pipe for cable ducts. They are currently having problems in ducts made of short cast concrete blocks which shift. Part of the rehabilitation plan calls for the contractors to rod and test the capacity of existing ducts. Where they are unable to remove defective cable they will have to reconstruct the ducts. They say that records are poor on the location of the telephone cables, gas and water lines.

They feel that their records are satifactory on cable pair assignments. The 2M56 Program includes plans to computerize records on assignments, cables, etc.

The following summarizes my thoughts on the switching aspects of the TCI venture:

TECHNICAL

2M56 Program: The switching specification prepared by SOFRECOM appears to be comprehensive. The response proposal (bid) from GTEI is very detailed, containing 8 volumes of technical

information. It appears to be aimed at meeting the goals of 2M56. Time did not permit me to make a technical evaluation of GTEI's systems (No. 1 EAX, XP-100, XP-1000). However, GTEI aims at similar basic considerations or criteria as used by the Bell System in the selection of switching equipment, i.e., Dependability, Flexibility, Modern Features, State-of-Art Technology (including future uses of technology advances), Reasonable Total System Cost, Documentation and Engineering Support, Training.

TCI: (based on visits to central offices and operating centers).

MDF (usually an indicator of system condition): Neat, uncongested, no excessive buildups on horizontal levels, no visible tangles, they say that they remove dead jumpers, not known if they assign for short jumpers, soldered connections tight and clean. Largest office visited serves 20,000 lines and there was little or no MDF activity - due to little or no in and out movement. This could change if the 2M56 Program meets its objectives and future programs provide the ability to add, move, change, etc., services.

Existing EMD: Equipment appeared to be in good working order. Most of it is less than 12 years old. Based on many call attempts we made via the network that were ineffective, I suspect that the interexchange trunk plant may not be well maintained.

New EMD: Equipment being installed looked very good - clean, neat wiring, etc. Installation by Iranians appeared competent. Installation interval of 6 months for a 10,000 line office was a crash job that looked very good.

Strowger SXS: Old but operational. Soon to be replaced.

Housekeeping: Central office quarters could be cleaner, particularly hallway floors. Food and beverages should be removed quickly or prohibited in equipment rooms.

C.O. Personnel: I had the feeling that there were more people around than were needed.

National Toll Operating Center: Looked disorganized, chaotic, and undisciplined. Girls were eating at the switchboards and were chatting in small groups of 3 or 4.

Information Center (Tehran): Appeared to be well organized and operated. All people appeared busy, positions were occupied and the operators were working seriously. Perhaps the ACD (automatic call distributor) helps by putting traffic through to the positions automatically and the position observing by supervisors is effective.

POSSIBLE TASKS FOR TCI BY BELL SYSTEM

Two roles:

1. 2M56 Program - evaluation of projects

2. TCI - support for ongoing administration, engineering, planning, and operations.

1. 2M56 Program - Evaluation of Projects

Consists of working with 2M56 Program Directors as technical advisors in reviewing plans and progress on implementation of hardware, software, buildings, outside plant facilities, installation, test and acceptance, etc. Guidance and advice on orderly transition and introduction of new systems and services; organization and management roles in clearly defining responsibilities, etc. Personnel planning including improved salary structure based on reward for merit, etc., removal of organizational barriers, team building, and encouraging coordination, cooperation, etc.

2. TCI - Support for Ongoing Administration, Engineering, Planning and Operations

Picks up and duplicates most of above description of work under 2M56 Program. It also has a longer range scope based on studies of the evolving, growing network; modernization via replacement of existing plant, use of central office to provide business customer services (centrex) and other new customer and private network services; the introduction of digital-time division switching in toll and local.

The Switching Team

Based on preliminary thoughts about the composition of a switching team to work on either of the above tasks:

Manager - responsible for overall coordination of the team plus planning on common items such as network and numbering plans.

Engineers on the switching team as follows:

1 - Local including loop plant, customer services

1 - Tandem, Toll, Signalling, and Private Network Services

1 - Traffic Engineering and Switching Aspects of Operator Services

1 - Operations, Maintenance, Administration

OVERALL

The expansion and modernization of the Iranian telecommunications network and the ultimate independence of the Iranians from employment of outside consultants is an ambitious program. It is commendable in view of Iran's national goals. I believe that it is achievable.

G. Spiro

HO-512-GS-djd

Atts.
As above

Copy (with atts.) to
J. A. Baird - AT&T - 195 Broadway

W. O. Fleckenstein
J. A. McCarthy
F. S. Vigilante
W. A. Tyrrell

Attachment 1

Bell System Team Members

Mr. Jack A. Baird
Vice President
Engineering & Network Services
AT&T
New York, New York

Mr. Robert Bright
General Manager, Government Projects
Western Electric Company
Winston-Salem, North Carolina

Mr. Robert Dalziel
Director - Network Administration
AT&T
New York, New York

Mr. Robert Harris
Engineering Manager - Facilities
AT&T Long Lines
Somerset, New Jersey

Mr. John A McCarthy
Director
Network Objectives & Private Network
Planning Center
Bell Laboratories
Holmdel, New Jersey

Mr. Henry M. Rickman
Staff Manager
AT&T Long Lines
New York, New York

Mr. George Spiro
Director
Local Switching Engineering Center
Bell Laboratories
Holmdel, New Jersey

Attachment 2

Areas of Interest

George Spiro Director, Local Switching Engineering Center Bell Laboratories	Local, Tandem and Toll Switching Subscriber Loop Plant Signalling Station Arrangements Customer Services, e.g., Centrex
John McCarthy Director, Network Objectives and Private Network Planning Bell Laboratories	Long Range Planning Systems Integration System Interfaces - People and Equipment Service Order Flow and Mechanization Business Office Operations Billing Operations
Robert Harris Engineering Manager - Facilities AT&T Long Lines	Transmission Planning Network Integrity Construction - Outside Plant and Building RF Spectrum Management
Robert Dalziel Director - Network Administration AT&T	Network Completion Switch Maintenance and Frame Operations Service, Productivity, and Volume Measurement Network Design (Traffic Engineering) Operator Services Installation and Repair Operations Management Organization

Attachment 3

IRAN

TELECOMMUNICATION COMPANY OF IRAN (TCI)

EXISTING JANUARY 1975

Subscribers with Dial Service	532,500
Population Centers with Dial Service	48 (Tehran, Tabriz, Esfahan, Shiraz, etc.)
Dial Service Including DDD	72 Wire Centers
Manual Service	250 Small Locations

Two exchanges provide telex to 600 subscribers
Three independent long distance systems exist:

- The Imperial Iranian Armed Forces
- The National Iranian Oil Company
- The National Iranian Gas Company

2M56* "Crash" Program Communication Objectives by March 21, 1978

1,500,000 Additional Subscribers
1,000 Locations Total on Automatic Service
6,000 Total Telex Subscribers served by 12 Electronic Exchanges
1 International Automatic Exchange
Conversion of all Manual Service to Dial Service
The Program provides for:

- New Plant
- Rehabilitation of Existing Plant
- Traffic Design
- Network Design
- Switching Centers
- Outside Cable and Wire Plant
- Transmission Facilities
- Buildings and Building Services
- Electric Power
- Factory Inspection
- Program Finance
- Contract Administration

---

* 2M56 stands for 2 million dial service lines by Iranian year 1356 (March 21, 1978)

INSTALLED CAPACITY
OF TCI LOCAL EXCHANGES IN TEHRAN MULTI-EXCHANGE AREA

(1)	ABASI	10000
(2)	AMIRABAD	10000
(3)	AMJADIYEH	20000
(4)	BAZAR	20000
(5)	BOULVARD	10000
(6)	DANESHGAH	20000
(7)	DARYA-E-NOUR	10000
(8)	EKBATAN	17600
(9)	ESHRATABAD	16000
(10)	FARAHABAD	15000
(11)	GHASR	20000
(12)	GHOLHAK	6000
(13)	JAMSHIDABAD	20000
(14)	MAHMOODIYEH	6000
(15)	NARMAK	7000
(16)	NIAVARAN	6000
(17)	NOUR SHARGH	15000
(18)	PAHLAVI	8000
(19)	REY	3000
(20)	SEPAHE GHARB	16000
(21)	TAJRISH	10000
(22)	TARASHT	5000
(23)	TEHRAN PARS	4900
(24)	YOUSEF ABAD	10000
(25)	ZARABKHANEH	10000
	T O T A L	295,500

INSTALLED CAPACITY

OF TCI AUTOMATIC, LOCAL EXCHANGES IN PROVINCES

(1) ABADAN	(1st Exch.)	8000
	(2nd Exch.)	3000
(2) AHVAZ	(1st Exch.)	10000
	(2nd Exch.)	3000
(3) AMOL		2500
(4) ARAK		6000
(5) ARDEBIL		4000
(6) BABOL		3000
(7) BANDAR ABBAS		4000
(8) BANDAR BUSHIRE		2000
(9) BANDAR PAHLAVI		2500
(10) BOROJERD		3000
(11) BEHBAHAN		1000
(12) BIRJAND		1000
(13) CHALUS		2000
(14) DEZFUL		2000
(15) ESFAHAN	(1st Exch.)	9000
	(2nd Exch.)	10000
	(3rd Exch.)	5000
(16) GHAZVIN		4000
(17) GHOM		4000
(18) GONBAD KABOOS		3500
(19) GORGAN		4000
(20) HAMADAN		3000
(21) KARAJ		5000
(22) KASHAN		3500
(23) KERMAN		7000
(24) KERMANSHAH		7000
(25) KHORRAMABAD		2000
(26) KHORRAMSHAR		5000
(27) LAHIDJAN		2000
(28) MALAYER		2000
(29) MARAGHEH		1500
(30) MASHAD	(1st Exch.)	10000
	(2nd Exch.)	8000
(31) NEISHAPOUR		1500
(32) NOWSHAHR		1000
(33) RAFSANJAN		2000
(34) RASHT		8000
(35) REZAIYEH		6000
(36) SABZEVAR		2000
(37) SANANDAJ		4000
(38) SARI		3000
(39) SHAHRUD		2000
(40) SHAHI		1500
(41) SHAHSAVAR		2000
(42) SHIRAZ	(1st Exch.)	8000
	(2nd Exch.)	9000
(43) SEMNAN		1000
(44) TABRIZ	(1st Exch.)	10000
	(2nd Exch.)	6000
	(3rd Exch.)	3000
	(4th Exch.)	5000
(45) YAZD		5000
(46) ZANJAN		2000
(47) ZAHEDAN		2500
T O T A L (Provinces)		237000
T O T A L (Tehran)		295500
T O T A L		532500

GTE INTERNATIONAL
INCORPORATED
TELECOMMUNICATIONS DIVISION
ONE STAMFORD FORUM
STAMFORD CONNECTICUT 06904 • 203 357-2000

ROBERT R. SANDERS
VICE PRESIDENT

July 7, 1974

Telecommunication Company of Iran
Old Shemiran Road
Tehran, Iran

Reference: Tender for Development of Iranian Telephone Switching Network
Tender No. 52/99

Gentlemen:

We are pleased to submit our bid for the expansion of the telephone exchange facilities of the Telecommunication Company of Iran in response to your referenced invitation to tender.

We believe you will find our bid fully responsive to TCI's requirements for the supply, installation and maintenance of a new and modern Stored Program Digital Computer Controlled Telephone Switching System, establishment of a Joint Venture manufacturing company, capable of producing this switching equipment and other electronic telecommunications products with a high degree of national integration, as well as a proposal for export markets for the Iranian factory and perhaps of greatest importance, a comprehensive training program for Iranian management, engineering technical and operational personnel in North America as well as Iran to make possible the rapid assimilation of this new system and technology.

GTE International's bid comprises:

PART A - 1 Volume in original plus three copies which include:

--GTE International's Bank Guarantee in the required form.

--The Unconditional Acceptance of the General Conditions of Contract in accordance with the form referred to as Attachment III of Part 1 of the Tender documents.

--The formal Conditions of the Tender and Contract stamped and signed by the Tenderer on each page.

GTE INTERNATIONAL

--The status of the GTE International, Inc. Certified Charter, including a copy of our Company By-laws and certified resolutions of the Company's Board of Directors which shows which person(s) and in what manner Contracts may be entered into and executed on behalf of the Company.

PART B - Eight Volumes in original plus three copies, plus three Volumes with additional information, which include:

--The Supply of Switching Equipment with a Proposal fully responsive to the needs of TCI as indicated by the Technical Specifications with all data, diagrams, equipment lists, time schedules, alternatives and options as requested.

--Local Manufacturing Proposal based on formation of a Joint Venture comprised of 60% Iranian ownership and 40% GTE International ownership.

--The local manufacturing bid proposes complete transfer of technology for the production of the No. 1-EAX, a modern Stored Program Computer Controlled Sealed Reed Switching Machine.

--An export policy is also set forth in this Part B, which will permit the Joint Venture Company to develop export markets in the future.

--Training Services in accordance with the requirements of TCI and the local Manufacturing Company to assure the development of Iranian managers, engineers, technicians and operational personnel. This will not only increase the quantity and quality of staff capable of handling the new, rapidly expanding systems, but will generally advance the technological level of the country as an appreciable pool of Iranians become familiar with and competent in these new high technology computer based systems.

--The Buyer's Technical Specifications for switching equipment stamped and signed on each page.

PART C - One Volume in original plus three copies which include:

--Bill of Quantities and Price Breakdown.

--Alternatives and Options.

GTE INTERNATIONAL

--Explanation of prices and assumptions made with prices, as well as a unit item catalogue of list prices, along with methodology for calculating switching exchange quantities and applying the unit prices.

We trust Telecommunication Company of Iran will find GTE International's proposal not only fully responsive to your requirements, but providing additional detail beyond that requested in order to facilitate the evaluation of our offer.

We understand from recent communications with TCI that you are considering the possible expansion of this program to even greater quantities than indicated in the Tender Specifications. GTE International is pleased to assure TCI that we believe no other company participating in this Tender has the technical and manufacturing capacity of General Telephone & Electronics Corporation in this regard. As the second largest telephone operating company in North America and the sixth largest in the world, GTE is currently adding more than 800,000 new telephones in its own networks during 1974.

The manufacturing capacities of GTE Automatic Electric in the USA and Canada offer a capability and capacity of proven Stored Program Telephone Switching Exchanges greater than any other manufacturer (with the exception of Western Electric Co.).

We are certain that TCI's limitations with regard to the rate of installation of new lines will not be supply of switching equipment, but will more likely be in:

a) Construction of new outside plant networks to match the central office program;

b) Construction of buildings to house the telephone exchanges;

c) The installation of subscriber's loop plant and stations.

Assuming, however, that the above essential elements can be handled in the quantity and within the time schedules desired by TCI in the development of its national network, GTEI would be capable of providing the following telephone switching equipment:

Imported

1) No. 1-EAX -- 200,000 to 300,000 lines per year, after allowing for normal buildup of technical capabilities, as explained in our proposal.

2) C1-EAX -- 50,000 to 100,000 lines/year.

3) CXP-5 -- 50,000 to 100,000 lines/year.

4) XP 100/XP 1000 -- 50,000 to 100,000 lines/year.

GTE INTERNATIONAL

Local Manufacture

1) No. 1-EAX -- 50,000 to 300,000 lines per year starting in third year reaching 300,000 by fifth year from initialing.

First in-service dates will vary from 18 to 30 months from Contract initialling depending on specific technical requirements of the exchanges ordered.

We wish to emphasize that 12-18 months ordering lead time will normally be required for any factory when increasing volume of supply by the magnitude indicated by TCI. This time will also be required with the first orders to verify all of the technical parameters of services, signalling and interface requirements and to complete the new circuits design and manufacture. In this regard we wish to assure TCI that interface of the new systems with existing systems is the area of greatest attention, expertise and experience of GTE. Any telephone operating company making investment in telephone switching systems expects a 25-30 year productive life from such systems. They cannot be replaced merely because they become outmoded, or because of new technology available.

Therefore, new electronic systems designed by GTE are specifically required, as a first pre-requisite, to live in harmony with existing systems. This has been accomplished to such an extent with No. 1-EAX that it is being applied in North America for additions or extensions to existing electromechanical exchanges, one of the most demanding interface requirements of any exchange.

We wish to further note that the interface problem in North America is probably more severe than in any other network in the world, as there are more than 1700 different operating telephone companies, with almost every type of telephone exchange manufactured anywhere in the world. Therefore GTE's telephone switching systems are designed to work in the North American environment and must have the inherent flexibility for adaptation to the various system types with which they will interface. GTE Automatic Electric has been solving these kinds of interface problems for more than 75 years, as it is the oldest and most experienced automatic telephone switching system manufacturer in the world.

We are also proud to mention that GTE Automatic Electric was chosen by the United States Government to design, manufacture and install for its most important defense communications network, the first worldwide electronic switching system (AUTOVON) connecting all of its military bases throughout the free world.

This system using electronic common control and a Reed Switch network, has been installed and providing excellent service since 1969/1970 at 34 sites in 13 countries, interfacing with the national network and various switching equipments of these countries. Four of those sites are in Germany, where Autovon interfaces automatically with the Bndespost EMD System.

GTE has additional interface capability in its Italian company, GTE Telecomunicazione, where it designs, manufactures and installs both electromechanical and semi-electronic Reed Switch Crosspoint Telephone Exchanges which interface with EMD systems, as well as with Pentaconta and LME Crossbar systems.

We recite the above capabilities and experience to assure TCI of both our concern and confidence that the interface between old and new switching systems is essentially a basic inherent requirement of any new design, and GTE's vast experience in solving such technical requirements for over three quarters of a century guarantees that adequate technical solutions are available for the interface between No. 1-EAX and EMD in Iran.

GTE International lastly wishes to assure TCI of its sincere desire to provide maximum cooperation in the accomplishment of your long range goals in the growth and modernization of the national telephone network of Iran. We believe our facilities, not only as a manufacturer but as a sister telephone operating organization, will provide TCI with the greatest opportunity for successful achievement of these goals in the shortest possible time. The job is not a small one; it is an enormous and ambitious undertaking. TCI will most certainly need all the assistance it can obtain from other telephone organizations. GTE is one of the few which has the capability and has experienced similar growth programs during the last decade. We are happy to place that experience at TCI's service.

GTE International, Inc. will be most pleased to provide additional data, clarification or other information which TCI may require in the evaluation of this proposal.

We look forward to success in this Tender and a long range mutually beneficial cooperation with the Telecommunication Company of Iran in the development of its national telephone network.

Very truly yours,

GTE International, Inc.

Robert R. Sanders
Vice President

RRS:amb

Attachment 5

PART B, SECTION II

SUPPLY OF SWITCHING EQUIPMENT

INDEX

ARTICLES

1. "A Statistical Methodology for Estimating Congestion in Complex Link Systems"
2. "Application of Link Traffic Statistics to Estimating Link System Congestion"
3. "An Analytical Methodology for Solving Complex Stochastic Network Problems"
4. "Modified Traffic Engineering Procedures for No. 1 EAX Considering the Effect of Grading"

TRAFFIC TABLES

J. A. McCARTHY

Bell Laboratories

subject: Visit to Iran - Trip Report

date: March 28, 1975

from: J. A. McCarthy

OUTLINE

INTRODUCTION

I. GENERAL OBSERVATIONS

- I-1 Summary
- I-2 Management Structure
- I-3 Meetings and Conferences

II. THE PRESENT SYSTEM

- II-1 Local Plant
- II-2 Long Haul Transmission
- II-3 Satellite Program
- II-4 Data Transmission
- II-5 Charges for Service
- II-6 Personnel and Training

III. PLANNING CAPABILITY AND STATUS

- III-1 PMO and the INTS Program
- III-2 Geographic Plans
- III-3 Attitude Toward a Master Plan
- III-4 Conclusion

Bell Laboratories

subject: Visit to Iran

date: March 28, 1975

from: J. A. McCarthy

TRIP REPORT

INTRODUCTION

A Bell System team, listed in Table 1, visited Iran from February 23 to March 1, 1975, to get an overview of the telephone system of that country. The purpose of the trip was to gather background information for possible proposal of a systems engineering program in support of the Iranian telecommunications system. There were a few general meetings, but usually the group split up to discuss topics with appropriate people in the Ministry of Posts Telegraph and Telephone (PT&T) and in the Telecommunications Company of Iran (TCI), which had extended the invitation. In addition, there were visits made to central offices, operating centers, and other points of interest.

This report focuses on problems observed by the author, who was responsible for looking into long range planning, systems integration, and the interface between people and equipment. We found no documented evidence of long range planning, systems integration, etc. Therefore, this report is a general evaluation of the systems engineering, organization, and present status of the telephone system. It is important to note that much of the information herein is based on hearsay from a few key sources, and often from individuals who had only a limited capability in English. Therefore, it cannot be depended upon for accuracy in detail.

The report is divided into three sections:

I. General Observations

II. The Present System

III. Planning Capability and Status

TABLE 1

Bell System Team Members

Mr. Jack A. Baird
Vice President
Engineering & Network Services
AT&T
New York, New York

Mr. Robert Bright
General Manager, Government Projects
Western Electric Company
Winston-Salem, North Carolina

Mr. Robert Dalziel
Director - Network Administration
AT&T
New York, New York

Mr. Robert Harris
Engineering Manager - Facilities
AT&T Long Lines
Somerset, New Jersey

Mr. John A. McCarthy
Director
Network Objectives & Private Network
Planning Center
Bell Laboratories
Holmdel, New Jersey

Mr. Henry M. Rickman
Staff Manager
AT&T Long Lines
New York, New York

Mr. George Spiro
Director
Local Switching Engineering Center
Bell Laboratories
Holmdel, New Jersey

I. GENERAL OBSERVATIONS

I-1 Summary

The telephone system in Iran contains some good equipment obtained from various sources. As part of the present 5-year plan, to end in March, 1978, the telephone company will procure a large number of new switches and will rehabilitate much of the cable plant in the country. In addition there may be substantial upgrading of the long haul transmission plant. However, there are deficiencies. (1) There is no overall plan for integration of the equipment other than an ad hoc matching at the interfaces. (2) There appears to be no reliable data which will define the traffic demand for the network. (3) Military requirements are not included in planning, but are imposed on the civilian network as the military sees fit. (4) There is an extreme shortage of technicians for maintenance of the system. (5) Overall control of operations is almost nonexistent.

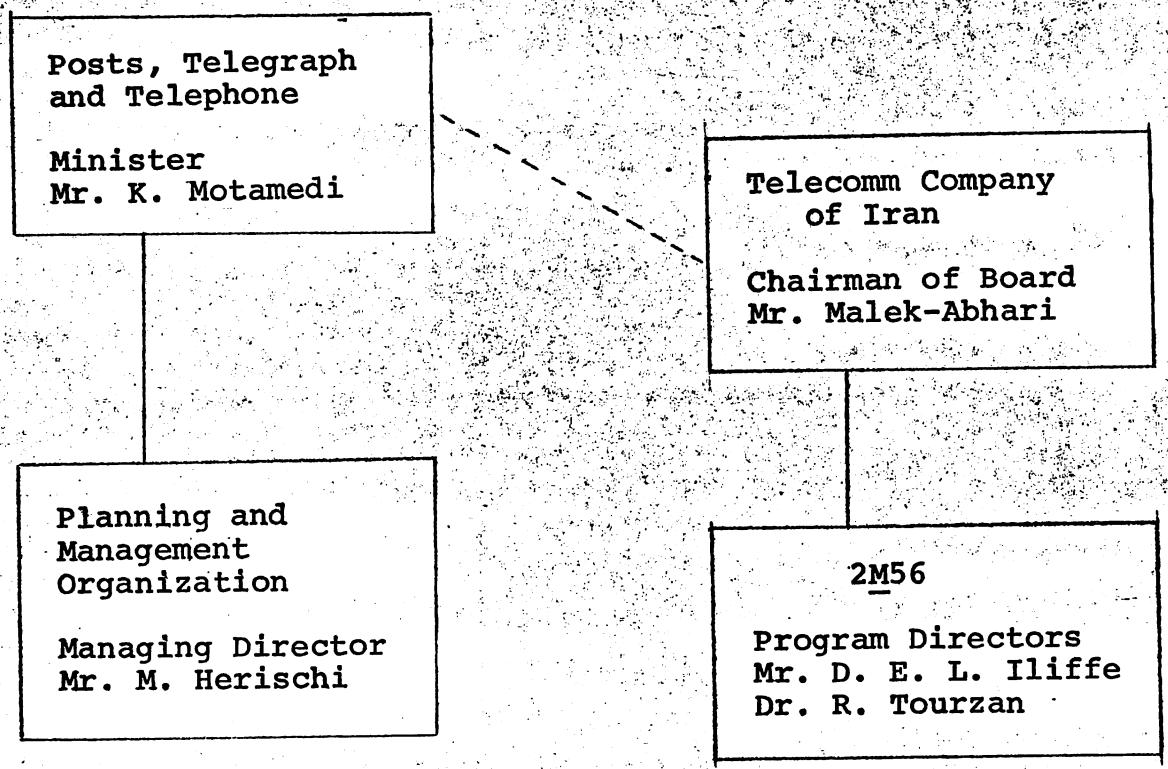
The management of the telephone system is aware of the above shortcomings. Many individuals expressed their desire that the Bell System would take a strong posture in straightening out the communication system of Iran. Previous experience has led them to conclude that the only hope is an organization with the resources, reputation, and size of the Bell System which can make itself felt in all areas of communication.

PT&T proposed that the Bell System would operate with two separate teams. One of the teams would deal with switching and local distribution, management and operations aspects of the program now in progress. The second would deal with long range planning and with the upgrading of the transmission system including consideration of the use of a domestic satellite. The planning task, which is of particular interest to the author, would involve not only PT&T and TCI but also interface with the other agencies which have communications needs. The latter include the National Iranian Radio and Television agency, the Civil Aviation Bureau, the military, the police, and the major industries.

I-2 Management Structure

The organization for communications development in Iran, shown in Figure 1, falls under the Minister of Posts Telegraph and Telephone. The system is operated by the semiautonomous

FIGURE 1


Posts, Telegraph and Telephone
Minister
Mr. K. Motamedi
Telecomm Company of Iran
Chairman of Board
Mr. Malek-Abhari
Planning and Management Organization
Managing Director
Mr. M. Herischi
2M56
Program Directors
Mr. D. E. L. Iliffe
Dr. R. Tourzan

Telecommunications Company of Iran. For our purposes, the key agency under the Ministry is the Planning and Management Organization (PMO) which will be discussed in detail in Section III. A key operation under the Telecommunications Company of Iran is the so-called 2M56 program, which is the procurement agency to achieve the goal of 2 million telephones by the end of the Iranian year 1356 (that is, by March 15, 1978). The 2M56 organization provides a good illustration of how technological development is taking place in Iran at the present time. At the head of the 2M56 program are co-Program Directors. One, Mr. D. E. L. Iliffe, is a contract employee provided by a body-shop operation.* His opposite number is an Iranian, Dr. R. Tourzan, who is assigned to learn from his coordinate. Dr. Tourzan is assigned the signature responsibility and general legal responsibility for the project. This type of pairing is common below the Deputy Minister level of the organization. A contract employee is coupled with an Iranian who has long term responsibility and who is to be trained by the contract employee. In a few cases, it was my impression that the Iranian might well not need training by the contract employee, however. In the 2M56 program, for example, Dr. Tourzan is extremely capable and there were at least three Iranians at the director level who appeared quite competent. They were Mr. Vojdani, Mr. Sabet, and Mr. Afjai. Vojdani is effectively operating without a contract coordinate. Mr. Larsson of Swedtele is working as his co-director for a few weeks and may nominate an individual to be paired with Vojdani. Vojdani is head of the Systems Engineering Directorate, which is by far the largest part of the 2M56 organization.†

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* Providers of contract employees include Page, Swedtele, Sofrecom, and Nippon.

† It is interesting to note here that we see for the first but not the last time a peculiar inconsistency in numbers. In an initial discussion, the Systems Engineering Directorate was said to have 39 expatriates and 28 Iranians. However, Mr. Vojdani's progress report for January 15 to February 15 shows only 27 expatriates and 25 Iranian professionals. This type of vagueness and inconsistency of detailed data is typical of many of our contacts in Iran and is the reason for the statement above regarding hearsay.

I-3 Meetings and Conferences (J. A. McCarthy)

Date		
2/24	a.m.	General large meeting at TCI with Mr. Malek-Abhari, Chairman of the Board, Mr. Iliffe, Mr. Vojdani, and Mr. Larsson.
	p.m.	Visit to the long distance facility at Sepah Square.
2/25		Several conferences with Iliffe and Tourzan. Examination of a number of documents and position papers delivered to us by Iliffe.
2/26	a.m.	Visits to local exchanges.
	p.m.	Further discussions with Iliffe and Tourzan.
2/27		Visits to George Edwards at the Directorate of Network Control and to Ulf Schandlbauer, the Director of Engineering for PMO.
2/28		Trip to Shiraz in part to observe conditions in cities and localities away from Tehran.
3/1	a.m.	Conferences with Sabet and Vojdani.
	p.m.	Conferences with Edwards and Schandlbauer. Conference with Iliffe.

II. THE PRESENT SYSTEM

II-1 Local Plant

There are about 500,000 local loops in Iran, more than half of which are in the city of Tehran. More than 90% of the stations are served by step-by-step equipment with Subscriber Trunk Dialing (STD), their form of DDD. Most of the step equipment is manufactured in Shiraz in a factory set up by Seimens. The equipment appeared to be of good quality and well maintained in the offices we visited. We also saw some old Strowger equipment, reportedly 28 years old, which is well maintained (and which is soon to be replaced). Installation is by Iranians and is neat and well-soldered both in the step equipment and in the main distribution frames. Since there is relatively little in-and-out movement, the distribution frames are in very good condition.

However, we did not see any provision for trunk testing. We were told that there was no routine testing of trunks. Presumably, there are large numbers of defective trunks in service. There was a recent demonstration of the Autrax system which reportedly detected 30-40% defective trunks in the interexchange plant. The 2M56 office is seriously considering a large scale purchase of Autrax.

The loop plant in Tehran is largely cable in concrete block conduit, but is simply buried in many other locations. The cable which we saw has three layers of plastic sheath with intermediate copper and aluminum shields. The wires use plastic insulation and no provision is taken for excluding water from the cable.* There is a water-level problem in Tehran because of the absence of central sewage facilities which may contribute to local plant problems.

The telephone company owns and operates the system up to terminal boxes located outside subscriber residences. A new subscriber is given one telephone and a pair of terminals to which he attaches his own wiring. Frequently, a large number (up to 10) stations, serving a number of different homes, may be attached to a single loop, causing severe loading of the loop. One subscriber answers the phone and signals by switchhook flashing (bell clapper sound) to the person on the "party line" receiving the call. When the new ESS equipment is installed, it will contain a switchhook disconnect feature to prohibit the practice. This may result in a more orderly party-line service. PBXs are also owned and installed by the customer, who is responsible for wiring to the terminal box. The result is a chaotic, disorderly, confused mass of wires and poor service quality. Local loop objectives have been established but loops are not tested since no one believes that there is any hope of achieving anything like normal loop objectives for noise or impedance. Iran may represent a good demonstration of the effects of uncontrolled interconnection of customer equipment.

II-2 Long Haul Transmission

Almost all inter-city transmission in Iran is served by a microwave network consisting of several different microwave systems installed by different suppliers. The Seven-Link system, supplied by a Japanese concern, is serving a number of routes. The CENTO system of RCA equipment is also a major part of the network. Finally, the new "Integrated National Telecommunications System," INTS, has been installed by a consortium of manufacturers under the general direction

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* However, it was reported that 25% of the cables in the long haul plant are pressurized. The purpose is not to reduce humidity but to detect breaks, particularly those which might be caused by people attempting to steal copper.

of the Page Company. The INTS is in service on almost all of its routes although none of them have been officially accepted by the Iranian government. The microwave system provides public telephone system, military lines, and distribution of television programs. The military reportedly uses about half of the voice communication trunks. An increasing number of these are FX lines from border stations which home on Tehran exchanges. This type of FX service has been growing rapidly and represents a source of considerable worry to the people in charge of network design.

The multiplex plan for long haul facilities is in a disorderly state. The overhaul, replanning and improvement of the long haul transmission facilities are not the responsibility of the 2M56 organization, but has been assigned to the PMO, directly under the Ministry. However, no one with whom I spoke, including the people at PMO, expects that the transmission plant can be upgraded on schedule to the needs of the 2M56 program. PMO representatives, for example, said that, with major changes in the way they operate, they could hope to come within 6 months or a year of the March, 1978 target date.

II-3 Satellite Program

The satellite program, Vilcom, as part of the long haul transmission facilities, is the responsibility of PMO. The key feature of the satellite program is distribution of four television channels through the satellite to about 750 villages. There has been no detailed planning or final decision on the method for distribution of television within villages. National distribution of television programs appears to be the major factor in the desire for a satellite, but no final decision to implement the satellite program has been made. A second major user of the satellite would be the military, but they were not reported to have any large part of the control of system design. Hughes has proposed a satellite system for a sum in excess of $200 million, but no final decision has been made. This is one of the areas where the Ministry would like advice and consultation from the Bell System.

II-4 Data Transmission

There are no special facilities for data transmission in Iran at present, but some leased lines are reportedly in use for data at about 1200 bits per second. Although data transmission is not included in the 2M56 program, they have requested proposals for a market survey of data needs in

Iran and expect to contract for a market study in the near future. The major competition is from the police. The national police have proposed a major national data network to serve their own purposes and to sell service to other potential users. The public telephone people oppose this, of course, and hope to complete a study of data transmission needs as soon as possible, in order to get responsibility placed with the telephone organization.

II-5 Charges for Service

In Tehran, a new subscriber deposits about $300 for a line which is provided after a wait of 6 to 24 months. Thereafter he pays $4.50 per month plus 3¢ per call. The resale price of a loop and number is reported to be $2500-$3000, so few people disconnect and get their deposits back.

Coin service is local only and accepts only a 2 rial (about 3¢) coin. There are plans to examine the feasibility of long distance coin service by the use of a magazine feed to operate with their periodic-pulse-metering system. Long distance calls are made either from private phones or from a public facility located at the telephone office. The latter is characterized by a large and crowded waiting room where people register calls and wait for their turn.

II-6 Personnel and Training

The problem of attracting, training, and retraining qualified personnel is probably the largest problem in telecommunications in Iran. In the past, technician jobs have had rather low salary and status. Attempts are being made to change this, and extensive training programs are now required as part of the purchase of new telecommunications equipment. However, the salaries of telephone employees are 50-75% below comparable salaries in private industry. As a result, retention is reported to be difficult except for people who value the security of the civil service system. It should be noted, however, that switching installation and frame maintenance appear to be well done in the offices visited.

In visits to operating facilities, we found poor housekeeping and a large number of people who were talking or doing nothing (or even, in one case, asleep). The problems of availability of craft people, of motivation, and of discipline are acute. The analogy which was used by Iliffe was buying a large, good, new automobile but having no qualified driver or mechanic.

To cope with the lack of trained people, the purchase of switching equipment from General Telephone for the 2M56 program will include provision for two years of maintenance and operation of the equipment by GTE, and for establishment of training centers for Iranian craftsmen and engineers.

The problem is serious since TCI hopes to add 7,000 or 8,000 new employees in the next three years, which will increase their force to more than 22,000 people. Thus, they are faced with the difficult problem of attracting and training personnel to meet an annual increase of 15%.

III. PLANNING CAPABILITY AND STATUS

III-1 PMO and the INTS Program

One of the key issues with the present 5-year program is the ability of PMO to handle the transmission program. In order to get an insight into that capability, I had a number of discussions with three people, Iliffe, Edwards, and Schandlbauer, each of whom was at one time part of PMO. We covered the technical organization and present staffing of PMO, but also covered questions such as reasons for high turnover and the history of the INTS program, in terms of both what had happened and what had been learned. Although there were minor differences in the way each interpreted the history and present capability of the organization, there was general agreement on level of capability and on the reasons for difficulty in INTS.

The technical sections of the PMO organization are shown in Figure 2. Finance and Administration are omitted since they are Iranian staff operations not significant to the line function which were were studying. Shown for each technical directorate is the contract individual presently in the job, with his Iranian counterpart listed below. There are three vacancies among the Iranian counterparts, two of which are recent. The Systems Engineering co-director was recently promoted out of the telecommunications business, and the Installation Test and Acceptance co-director was recently transferred to PT&T.

The present staff is described as stable but not necessarily well matched to the Transmission Planning job. Stability, if it is true, would be a somewhat unusual condition in PMO. Tenure there was described by various people as averaging from 6 months to a year. The present organization is basically a fire-fighting operation devoted to settling problems

which continue to come up as the INTS program nears its completion. None of the three people interviewed on the subject felt that the present organization structure and practices would be satisfactory for the transmission portions of 2M56. The only difference was in the degree to which each felt it would have to be changed. Schandlbauer had the hope that with some changes in administrative practices it could work out. The others felt that it would require changes in attitude and extensive changes in personnel as well. All said that there was little possibility of success in the transmission job unless some agency as large and prestigious as the Bell System entered the picture and straightened things out.

The Directorate of Network Control is not shown as part of the PMO organization since it nominally reports to the Deputy Minister for Planning for technical guidance. However, in most peoples' minds, it is more nearly a part of PMO than the organization charts would indicate. The reason is that its detailed financial approvals and budgets flow through PMO, not through Planning. The control resides basically in PMO, although there is some degree of independence.

With respect to the INTS task, the opinions expressed by the three people (Iliffe, Edwards, and Schandlbauer) might be considered libelous if they were directly recorded. All recounted essentially the same story. First, an organization came in to do a job which they did not understand, in an environment they apparently did not understand, and attempted it with far too few people and far too little provision for control of the program. Some of the contract personnel reportedly were dishonest. The negotiated contracts included loopholes and provisos which effectively freed the consortium from any real responsibility for results. Finally, in the initial approach to the job, a large number of things were cut back and jury-rigged in the interest of false economy. Fixes were required which made the ultimate cost unduly high.

As the program grew more and more expensive, it was recognized by Page management and by the Iranian government that it had gotten totally out of control. PMO was established to provide for some government control of the operation. However, even after PMO was set up, the representatives of consortium members (reportedly) had established close relations with some of the senior government people and were able to invalidate actions taken by members of PMO. The result was a

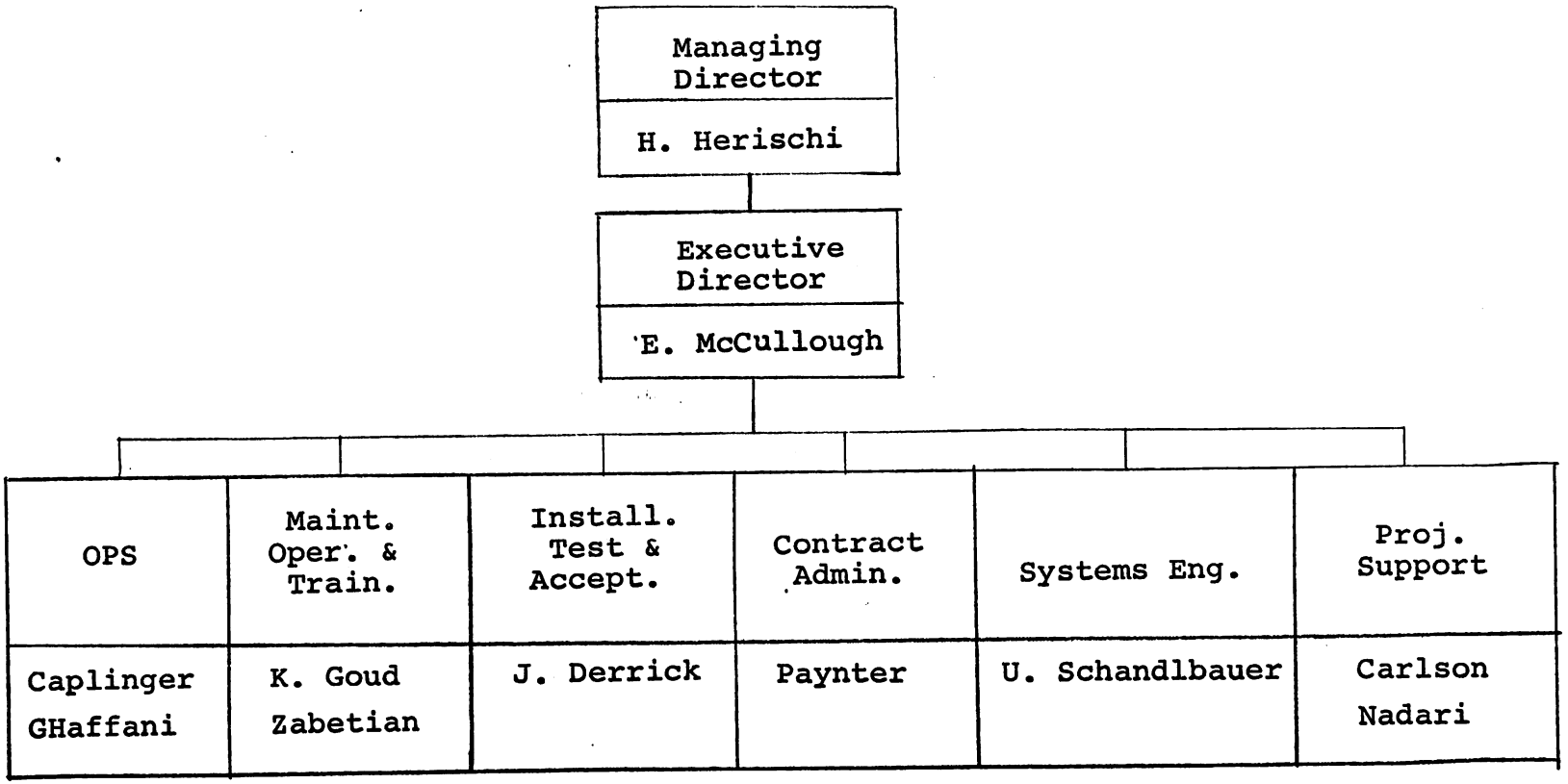

FIGURE 2

demoralized organization in which, for example, over 30 of the directors and co-directors changed in about three years. Mr. Herischi, the present managing director, is the fourth man to hold that job in four years. The people in PMO think that he will be more stable in the role than his predecessors.

In summary, PMO has some developing stability and some capabilities but little background knowledge or experience in planning. If it is to do a transmission facilities planning job, it will need help, guidance, and even strong direction.

III-2 Geographic Plans

A part of the long range plan will be the study of the future distribution of population throughout Iran, including the effects of both deliberate actions of the civil government and the plans of the military. There is an aggressive program by the Ministry for Rural Development to establish new towns throughout Iran in order to draw people toward agriculture, particularly from Tehran. The 2M56 program calls for extension of telephone service to 750 towns with 5,000 or more population, by definition, of which 300 are reported to be new towns. An efficient telephone system might allow more dispersal of industry and people to smaller cities away from Tehran. There appears to be a move in the military toward the establishment of major bases on the southern coast of Iran. These bases will represent additional major markets for communications.

III-3 Attitude Toward a Master Plan

Of the problems discussed during the visit, the ones most frequently mentioned were personnel training (and retention) and the absence of a long range plan. Many individuals ventured the opinion that only an organization like AT&T could have the prestige which would allow it to deal effectively with the many agencies that will need communication service of one kind or another. All of the key individuals (including a somewhat reluctant Iliffe) said that they would be happy to work under AT&T's "control," if necessary, in order to get a solid program going in Iran. In general, they were pessimistic about the chances of success beyond 2M56 without AT&T, and some were not even optimistic about 2M56 itself.

III-4 Conclusion

AT&T participation in telecommunications planning and coordination in Iran was supported by everyone we contacted.

In particular, they would welcome a master plan for communications which could only be formulated by a strong but nonpolitical organization. The challenge of the program would be to establish a plan which, by 1983, would bring the telephone system up to the quality of a typical European system.

The formulation of a master plan would require more effort than had been anticipated because of language difficulties and the apparent absence of any planning documents. The additional effort would result from requirement of much more time in Iran, especially for the senior people, and from a need to explore more optional courses of action. A team of about 25-30 BTL top professionals, resident at BTL (except that 4-8 would be in Iran at any given time), would be my estimate according to present information. Another part of the effort would be consultation and support services from BTL people on a short-term basis. About 5 EMTS years/year might be involved. Studies of a satellite transmission plan and T.V. distribution could add another dozen.

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