



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

RESTRICTED

18th February 1968

English

PROJECT IN THE ARAB REPUBLIC OF EGYPT

DP/EGY/81/028/11-58/31.4 E

FINAL REPORT

TECHNICAL ASSISTANCE TO EL NASR COMPANY FOR
TELEVISION AND ELECTRONICS

Pentti O A Haikonen,
Expert in Electronics Industry

*This report has not been cleared with the United Nations
Industrial Development Organization.*

EXPLANATORY NOTES

Abbreviations

CKD-kit	Completely-Knocked-Down kit, kit that contains components and parts for one TV-set
CRT	Cathode Ray Tube, picture tube
IC	Integrated Circuit
PCB	Printed Circuit Board
R&D	Research and Development

Exchange Rates Used

1 USD = 1.3433 L.E.

1 JPY = 0.005 USD

DP/EGY/81/028/11-58/31.4E

TECHNICAL ASSISTANCE TO EL NASR COMPANY FOR
TELEVISION AND ELECTRONICS

FINAL REPORT

ABSTRACT

El Nasr Company for Television and Electronics is interested in increasing the local production of television components. For that purpose the present status of TV-set and component production in Egypt is reviewed and the number of locally manufactured components is found to be low.

The quantities and value of the various components in a TV-set are assessed.

The local production of wound components and electro-mechanical components is recommended.

Also strong R&D effort on component manufacturing and TV-chassis design is recommended.

Cooperation of industry and universities is recommended.

A UNIDO project to facilitate the early commencement of local component production is proposed.

TABLE OF CONTENTS

	INTRODUCTION	1
I	CONCLUSIONS AND RECOMMENDATIONS	2
	A. Conclusions	2
	B. Recommendations	3
II	THE PRESENT STATUS OF THE PRODUCTION OF TELEVISION SETS AND COMPONENTS IN EGYPT	5
	A. Television sets	5
	B. Components	6
III	TRENDS IN THE MANUFACTURE OF TELEVISION SETS	7
IV	POSSIBILITIES FOR FUTURE PRODUCTION OF COMPONENTS IN EGYPT	10
	A. Assessment of TV-set components	10
	B. Possibilities for local production of components	14
V	NEED FOR R&D FOR PRODUCTION OF COMPONENTS IN EGYPT	19

INTRODUCTION

The El Nasr Company for Television and Electronics, Dar El Salam, Cairo, Egypt, have been manufacturing black and white television sets since 1959 and colour television sets later on. Originally all major components for the B&W sets were manufactured locally.

However due to changing conditions and rapid technical development in television electronics the company had to revert to CKD (completely-knocked-down kit) set production. The kits were imported from Europe and later on from Far East and meanwhile the content of locally manufactured components dropped sharply.

The Egyptian government policy is to encourage the local production of electronic components in order to achieve foreign currency savings.

El Nasr Co is interested in increasing the content of locally manufactured components in their TV-sets and UNIDO was approached for help to evaluate the situation and to give recommendations for future actions.

This document contains the findings and recommendations of Mr. Pentti O A Haikonen, expert in electronics industry, who has visited El Nasr Company during 5. - 25. 2. 1986. The contact person in El Nasr Co has been Mr. Ashraf G Hamdi, Chairman.

I CONCLUSIONS AND RECOMMENDATIONS

A Conclusions

The main production facilities of the EL Nasr Company for Television and Electronics consist of PCB-assembly lines with flowsoldering machines. New automatic component insertion machines are being installed.

Printed circuit board production is about to start.

New injection moulding machines for cabinet production are being installed.

Black and white picture tubes are produced and the machinery is being partly renewed.

As it is the factory is geared to high volume CKD-kit assembly with the local manufacture of cabinets, B&W picture tubes and some other components. In this EL Nasr Co for TV have accumulated extensive production know-how.

However, whenever a new product is needed, a complete licence must be bought and very little of the existing know-how can be transferred to the production of components for the new product. This is due to the limited R&D resources of the company. Without adequate R&D resources required components cannot be designed and produced even if the production facilities were available.

Eventually the local R&D effort will reach the required level, but without external assistance the time lag may be excessive.

B Recommendations

1. *It is recommended that more resources are allocated to the R&D department of the El Nasr Company for Television and Electronics so that R&D groups for local component production can be established and further on for the local design of the TV-chassis.*
2. *It is recommended that cooperation between El Nasr Company for Television and Electronics and the technical universities and the Electronic Industries Research and Development Center should be increased and strictly defined long term R&D projects for local component production should be carried out by the latter.*
3. *It is recommended that the possibilities for local production of wound components should be investigated.*
4. *It is recommended that the possibilities for local production of electromechanical components should be investigated.*
5. *It is recommended that semiconductor research and manufacture on laboratory scale should be considered either at the universities or at the Electronic Industries Research and Development Center.*
6. *It is proposed that a UNIDO project should be set*

*up to facilitate the early commencement of local
production of TV-set components.*

II THE PRESENT STATUS OF THE PRODUCTION
OF TELEVISION SETS AND COMPONENTS
IN EGYPT

A Television sets

At present there are four television set manufacturers in Egypt. These are:

- Arab Transistor Co
- Benha
- El Nasr Co for Television and Electronics
- Philips

All these companies assemble imported CKD-kits, both colour and monochrome.

The approximate production volumes are as follows:

Company	colour sets/a	B & W sets/a
Arab Transistor Co	200 000	175 000
Benha	20 000	few
El Nasr Co for TV	200 000	120 000
Philips	20 000	few

It is estimated that the total of 400 000 colour TV sets and 300 000 monochrome sets will be sold during 1986 in Egypt.

Arab Transistor CO and El Nasr Co for TV are practically sharing the market half and half. About 10 % market share remains for the two smaller companies.

None of the companies are exporting significant quantities at present.

Generally the imported CKD-kits are complete with all required parts and components excluding cabinet and in some cases the B&W picture tube. The local assembly work consists of component insertion, soldering, final assembly and alignment.

B Components

The following parts and components for television sets are produced in Egypt presently.

- Cabinets
- B&W picture tubes

Plastic cabinets are manufactured by injection moulding. The emblems etc. are hot-printed.

ElNasr Co. for Television and Electronics have a CRT factory for monochrome picture tubes. About 85000 17" thick-neck monochrome picture tubes are produced annually. These tubes are all used by El Nasr itself. Electron guns and glass bulbs for these tubes are imported.

There are plans to commence the local production of certain other components. For instance loudspeakers and tuners are to be assembled locally by the end of 1986 by Government order.

Electrical cables and wires are produced in Egypt and these could be used in television sets.

III TRENDS IN THE MANUFACTURE OF TELEVISION SETS

Digital chassis

Certain manufacturers have introduced television sets with digitalized chassis. Within the digital chassis the demodulated video is analog-to-digital converted and the colour decoding is performed digitally. For the picture tube the digital video is converted back to analog form. Digital colour decoding requires no tuned circuits nor delay lines. Also the number of resistors and capacitors is decreased sharply. There will be no aging or drifting. Especially there should be benefits in the production of multistandard receivers.

When the digital chassis is combined with digital frame memories remarkable improvements in picture quality can be achieved. Interlace flicker can be removed and large area flicker can be reduced by increasing the display frame frequency. Also image enhancement and freeze-frame are possible.

At the moment digital chassis is more expensive than the analog one and also the frame memories are rather expensive. However, the prices for the required digital components are coming down quickly and a breakthrough could be expected in 5 to 10 years.

New picture tubes

Receivers with flat square tubes (FST) have been introduced recently. The FST-tubes have square corners and flatter **screen** due to doubled curvature radius.

Receivers with FST-tubes have stronger market appeal and higher pricing can be applied specially for the larger screen sizes.

Surface mounted components

The circuitry can be miniaturized further by the use of surface mounted components with hybrid circuit technology or polymer technology. Polymer technology is now extensively used in calculators and other miniaturized equipment.

Special machinery is needed for the insertion of surface mounted components. However with this machinery the assembly of the circuitboards will be practically fully automatic.

Without special equipment the service of surface mounted circuits is rather difficult.

Flat display panels

Miniature TV-receivers, both B&W and colour with flat and thin liquidcrystal display panels (LCD) have been introduced recently. These truly pocket-size receivers have mainly novelty value at the moment. However if larger LCD-screens with improved contrast, resolution and viewing angle could be produced these would be ideal

for portable receivers due to their low power consumption and small depth. This may still take some 5 - 10 years.

With LCD-panels no high voltages are needed and conventional deflection circuits are replaced by digital scanning.

IV POSSIBILITIES FOR THE LOCAL PRODUCTION
OF COMPONENTS IN EGYPT

A Assessment of TV-set components

For the maximum benefit a component to be produced locally should have a value of high proportion of the total value of the TV-set components.

Additionally low capital investment need for the local production would be preferred.

Also the component to be locally produced must be needed in the future. Advances in technology are constantly phasing out certain components or they are being replaced by others (tubes, paper capacitors, convergence coils, LC-IF-filters etc). Investments for this kind of components may not be recovered.

There are some 60 different items in a typical TV-receiver most of them of low value. Unfortunately the higher proportion of the total value is concentrated to few high technology items and extensive know-how and high investments are required for the production of these.

In the following table the components of a TV-set are assessed according to their decreasing value.

Table IV/1.

No	item	av. quantity per set	av. value USD	value per set USD	% per set value	total value/ 200 000/a million USD	total value/ 500 000/a million USD
1.	CRT+deflection yoke assembly	1	130	130	40.6%	26	65
2.	Cabinet	1	40	40	12.5%	8	20
3.	Integrated circuits	12	2.25	27	8.4%	5.4	13.5
4.	Tuner	1	17	17	5.3%	3.4	8.5
5.	PCB:s	-	-	10	3.1%	2	5
6.	Flyback trafo	1	10	10	3.1%	2	5
7.	Coils	-	-	10	3.1%	2	5
8.	Socketts	-	-	10	3.1%	2	5
9.	Transformers	2	3.5	7	2.2%	1.4	3.5
10.	Transistors, power	5	1	5	1.5%	1	2.5
11.	Cabling, jumper wires	-	-	4	1.2%	0.8	2
12.	Switches	17	0.2	3.4	1.1%	0.68	1.7

cont.

13.	Plugs	-	-	3.3	1 %	0.66	1.65
14.	Electrolytic capacitors	70	0.04	2.8	0.9%	0.56	1.4
15.	Potentiometers	-	-	2.25	0.7%	0.45	1.125
16.	Screws, nuts washers	-	-	2.25	0.7%	0.45	1.125
17.	Ceramic capacitors	100	0.02	2	0.6%	0.4	1
18.	Diodes, small signal	60	0.03	1.8	0.6%	0.36	0.9
19.	Resistors, carbon film	200	0.008	1.6	0.5%	0.32	0.8
20.	Loudspeaker	1	1.5	1.5	0.5%	0.3	0.75
21.	Transistors, small signal	30	0.05	1.5	0.5%	0.3	0.75
22.	Heat sinks	-	-	1.5	0.5%	0.3	0.75
23.	Crystals	2	0.7	1.4	0.4%	0.28	0.7
24.	Diodes, power	10	0.1	1	0.3%	0.2	0.5
25.	AC-cord	1	1	1	0.3%	0.2	0.5
26.	Others (about 35 items)	-	-	23	7.3%	4.6	11.5

Explanations for table IV/1.

The items are listed according to their value per set.

Average quantity/set is the typical quantity of the specified item that is to be found in a medium complexity colour television set. The indicated figure is based on actual component count of a medium complexity (three standard) receiver without remote control.

Component and part prices are based on actual prices C&F Egyptian port, without tax and duty.

Figures may be slightly rounded.

Where average quantity per set and average value are not indicated, the item is treated collectively.

Total value/200 000/a is the total value in million US dollars of the specified item for an annual production of 200 000 sets. Respectively total value/500 000/a is the total value for an annual production of 500 000 sets.

B Possibilities for local production of components

Picture tubes

The value of colour picture tube with deflection yoke assembly is about 40 % of the total component cost of a typical television set.

El Nasr Co have facilities for monochrome picture tube production and these might be extended for certain final assembly steps for colour picture tubes. In fact there are plans to that direction. Possibilities for deflection yoke assembly and installation should also be investigated.

Cabinets

Injection moulded plastic cabinets are already being produced locally.

Semiconductors

The value of semiconductors (integrated circuits and discrete components) amount to a considerable part of the total set component value.

Semiconductors are summarized as follows:

No	Item	value/set USD	% of total value	value for 200 000/a million USD	value for 500 000/a million USD
3.	Integrated circuits	27	8,4%	5,4	13,5
10.	Transistors power	5	1,5%	1	2,5
18.	Diodes small signal	1,8	0,6%	0,36	0,9
21.	Transistors small signal	1,5	0,5%	0,3	0,75
24.	Diodes power	1,0	0.3%	0,2	0,5
26.	Zeners LEDS, misc	2	0.6%	0,4	1
		38,3	11,9%	7.66	19.15

Heavy investments would be needed for local production. The integrated circuits for television receivers are usually special linear types which may not be applicable for other manufacturers' CKD sets.

Local IC-production should be accompanied by local TV-set circuit design.

Tuner

The local production of tuners is planned to start during 1986. However the semiconductors and most of the other components for these must still be imported.

Printed circuit boards

The local production of printed circuit boards is to begin shortly.

Wound components

Wound components are summarized as follows:

No	item	value/set USD	% of total value	value for 200 000/a million USD	value for 500 000/a million USD
6.	Flyback trafo	10	3%	2	5
7.	Coils	10	3%	2	5
9.	Transformers	7	2%	1.4	3.5
		27	8%	5.4	13.5

The value of all wound components amount to a considerable part of the total set component value. Wound components are very suitable for local production. Only modest investments are needed.

Many wound components, specially flyback transformer contain ferrite cores. Ferrite material is rather expensive and in order to realize maximum savings also the possibilities for ferrite production should be investigated.

Electromechanical Components

Electromechanical components are summarized as follows:

No	item	value/set USD	% of total value	value for 200 000/a million USD	value for 500 000/a million USD
8.	Sockets	10	3%	2	5
12.	Switches	3.4	1%	0.68	1.7
13.	Plugs	3.3	1%	0.66	1.67
		16.7	5%	3.34	8.37

Electromechanical components are usually parts with plastic bodies and plated metal contacts or pins. Connector-type components are rather easy to manufacture.

Generally only modest investments are needed for the production of electromechanical components.

Electromechanical components should be very suitable for local production.

Discrete passive components

Capacitors; electrolytic capacitors, ceramic capacitors, etc, resistors; low wattage carbon film resistors, etc, are found in a TV-receiver in great numbers. However, their unit value is very low and accordingly their total value remains low. Electrolytic capacitors might be the best candidate of these for local production.

Cables, wires

Cables, jumper wires, AC-cord constitute about 1.5 % of the total set component value. These could be readily replaced with local products.

Hardware

Screws, nuts, washers, heat sinks and various metal supports constitute about 1.8 % of the total set value. Local substitutes might be found for these.

Loudspeakers

Local loudspeaker production is planned to start during 1986.

Others

Others (about 35 items) constitute about 7 % of the total component value. This group contains items like higher wattage resistors, tantalum and polyester capacitors, zener diodes, LEDs, labels, insulators, etc only few of each. Certain items might be easily produced locally, but their value is very low.

V NEED FOR R&D FOR PRODUCTION OF COMPONENTS
IN EGYPT

There are two different strategies for the commencement of component production in Egypt.

- 1.) Component production is based on licence*
- 2.) Component production is based on own R&D effort.*

With a licence local component production can be started rather quickly.

Own R&D will give freedom of licences. However, extensive R&D and testing are nowadays required for many of the TV-set components. Thus the time lag from the beginning of the R&D effort to the start of actual production may be several years.

Even a licence operation should be accompanied with strong R&D activity. Advances in TV-circuitry are constantly necessitating components with new electrical values and even making some components redundant or obsolete, which are replaced by new ones. With strong R&D the produced component can be modified to suit the prevailing requirements and further developed for later applications.

Otherwise a new licence must be bought every time a new version of the produced component is needed or in the worst case, the production of the component will cease altogether and it must be imported again.

Thus the local component production should always be accompanied by R&D effort.

Eventually a R&D leading to a local design of the TV-chassis would give the highest freedom to the component usage.

Certain long term segments of the R&D effort could be performed by technical universities and the Electronic Industries Research and Development Center.

However, it is realized that local R&D effort cannot be stepped up immediately to the required level. Therefore further assistance by UNIDO would be required to facilitate the early commencement of local production of TV-set components.

To this end a UNIDO project should be planned. This project should include

- Technical assistance by experts on wound components and electromechanical components and on any other components chosen to be manufactured locally*
- Technical assistance for evaluation of possible licensors*
- Training of Egyptian engineers and technicians either in Egypt or abroad.*

The duration of this project should be about 2 years. The El Nasr Co for Television and Electronics would be a suitable Egyptian counterpart.