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CLOSED CIRCUIT TELEVISION  
EQUIPMENT POTENTIAL IN CANADA

Client: Industrial Development Branch  
Department of Regional Economic Expansion

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PLEASE NOTE

This report has been edited, where necessary, to remove comments and data that are classed as confidential. In the interest of efficiency, this has been done by simply removing small sections of the report. As a consequence, there are some blank spots which, we hope, will not interfere with the readability of the report.

Department of Regional Economic Expansion

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## EXECUTIVE SUMMARY

Closed circuit television is a system of transmitting television signals to receiving equipment linked directly by coaxial cable, microwave relay or telephone lines. It consists of four basic types of equipment: cameras, monitors, video tape recorders, and special effects equipment.

Traditionally the markets for CCTV equipment and systems have been in industry, education, cable television, government, and medicine. Although no Canadian data exists, based upon United States experience the market for this equipment in 1970 was \$9 million, and it is estimated that this will grow to \$14 million in 1975 and \$24 million by 1980.

The greatest potential market for CCTV equipment lies in home entertainment units. This unit is based upon the development of the technology that will result in a low-priced video tape recorder. This technology is now available and at least twenty incompatible systems are under development. At this stage of product development, the potential market for home units is impossible to predict.

In Canada there are no major producers of CCTV equipment. However, this industry has no shortage of manufacturers. Virtually all equipment is supplied by American, Japanese and European manufacturers. American and European equipment manufacturers dominate the market for high-priced sophisticated equipment. Japanese firms dominate the lower priced, less sophisticated markets.

Canada appears to lack the necessary skills for participation in the closed circuit television equipment industry. As a nation, we possess neither the necessary technology nor low labour costs that are vital to success. Opportunities may exist for television manufacturers to assemble home entertainment units if that market develops successfully.

Opportunities do exist in the software side of the industry for technicians who are properly trained to install and market equipment suitable to the needs of the present users of CCTV equipment.

1 - INTRODUCTION

The purpose of this study as outlined in the Terms of Reference is to assess the opportunities for prospective entrepreneurs in the closed circuit television equipment and systems market. This study was to provide:

- (a) - The supportive data and analysis that will give the Industrial Development Branch of the Department of Regional Economic Expansion an indication of the magnitude of the opportunity and to spell out the implications of setting up plants within the designated regions and special areas of Canada.
- (b) - An entrepreneur with sufficient information on the potential manufacturing opportunity so that he will be willing to pursue it further if positive conclusions are reached.

Unfortunately, the CCTV industry is very "untidy" as is usual in a new industry during its early stages of development. Absolutely no "hard data" exist for this industry in Canada. Efforts were made to arrive at sales and import data through Information Canada, trade organizations, trade journals, and industry participants. All attempts proved unsuccessful.

This data problem was discussed with the Industrial Development Branch of the Department of Regional Economic Expansion at an early stage in the analysis. A decision was made at that time to proceed with the study, fully realizing that the final report would be devoid of "hard analysis".

Great reliance was placed upon United States statistics. One source was used extensively: a market study prepared by Frost and Sullivan, Inc. of New York. This study was used as it proved to be the most complete analysis of industry prospects. However, it shall be cautioned that the figures prepared in that study differed significantly from other data sources such as the publication Merchandising Week and Electronics. Market forecasts seem to vary from extremely optimistic to slightly pessimistic depending upon the stake in the industry of the individuals producing the forecasts.

Thus this report should be used with great caution and should serve only as the bases for a more thorough analysis of an industry which may emerge as one of the major growth industries of the late seventies:

## 2 - THE CLOSED CIRCUIT TELEVISION SYSTEM

Closed circuit television (CCTV) is a system of transmitting TV signals to receiving equipment linked directly by coaxial cable, microwave relay or telephone lines. CCTV installations are available that consist of no more than one camera with a connected monitor, to extremely complex multi-locational studio arrangements with switching capabilities permitting two-way audio and video communication.

A basic system consists of a non-viewfinder camera connected to a monitor. This type of system is common in surveillance work. By adding equipment to this basic unit one can establish a studio which will permit taping of what is being monitored for a future showing. This system may consist of one or two viewfinder or non-viewfinder cameras, a monitor, a videotape recorder and a very simple switcher to permit going from one camera to another. Cost of such a system ranges from \$1,500 to \$20,000 depending on whether the cameras are viewfinders or non-viewfinders, color or monochrome and other considerations.

This system can be further upgraded by having two viewfinder cameras and a switcher-fader which permits the selection of the best picture and provides the ability to fade, dissolve or switch from one camera to the other. All the switching equipment is built into a console for operating convenience. Price range for a system of this type is from \$15,000 to \$40,000.

A full studio of the type that may be used in a Community Antenna Television System (CATV) would include everything in the smaller unit plus a non-viewfinder camera for superimposing titles, equipment for showing films and slides, a special effects system, a tape recorder with slow motion capability (plus electronic editing) and an expanded switcher. Such a system would start at \$50,000.

Recently several firms have started to market on a limited scale a portable compact total package of video and audio recording with playback equipment. These systems are priced

in the \$1,500 to \$2,000 range and are expected to decline further in value.

The following section describes each of the four major types of equipment: cameras, monitors, video tape recorder and other equipment that make up a CCTV system. In addition, some comments are addressed to the software side of the CCTV industry.

## 2.1 - Cameras

- (i) - Viewfinder camera: This camera has a small built-in monitor that allows the camera operator to see what the camera is picking up and how, so that he can make the necessary adjustments.
- (ii) - Non-viewfinder: A simple, smaller and more compact camera than the viewfinder, it has the disadvantage of not providing the operator with a monitor to see the picture quality. Its main use is for monitoring applications.
- (iii) - Vidicon type cameras: These are the most simple, reliable, and economic cameras that are presently available for CCTV use. Usually they occupy less than a cubic foot and are most suitable for mounting in a fixed location. The disadvantages of the vidicon tube is that it has a slow response under low lighting conditions which can cause blurring of moving objects. New vidicon cameras have been specifically designed to operate in dimly lit areas.
- (iv) - Image-Orthicon tube cameras: These cameras are larger, heavier, complex and very costly. However, they are unequalled for their ability to produce high-quality pictures especially under conditions where relatively high light levels are unavailable. These cameras range in price from \$10,000 to \$30,000.



- (v) - Plumbicon tube camera: This type of camera is a comparatively new development which, in terms of performance and cost, is located between the vidicon and image orthicon tubes. The picture quality and the speed of response are excellent at low levels of illumination. Price is in the \$5,000 to \$10,000 range.

## 2.2 - Monitors

Monitors come in a wide variety of sizes and are available in monochrome or color. Monitors that are designed specifically for closed circuit television uses allow only one channel viewing. Increasingly standard television receivers are being adopted so that they can be used for closed circuit television purposes. A \$70 adapter is available that allows use of any empty channel on a television set for closed circuit viewing.

## 2.3 - Video Tape Recorders

The introduction of the relatively inexpensive videotape recorder (VTR) has had the most profound effect on the CCTV industry. In contrast to film, a video tape can be played back at once and can be erased and reused many times.

There are two basic types of VTR's in use today, the quadraplex and the helical scan. The quadraplex is most frequently found in broadcast and high-quality production centers. This system offers high quality and has recently added the feature of compatibility so that tapes made on one quadraplex VTR can be played back on any other quadraplex VTR. These VTR's are very costly starting in price around \$30,000 and running to in excess of \$100,000. This puts it out of the reach of all but a few CATV installations.

The helical scan is easily the most popular system because

of its low cost and ease of portability. At least 20 VTR systems are under development using the helical scan principle of video recorder. The major systems which consist of a videotape recorder-player are described below.

2.4 - Other Equipment

As soon as a user of CCTV equipment attempts to produce films for widespread showing, additional equipment is necessary to achieve respectable quality. Studio equipment purchased depends upon the budget restraints and level of sophistication desired in the finished product. The following is a partial list of equipment that may be incorporated into a

studio operation:

- (1) - Sync Generator: This device generates all the pulses which are used to synchronize the vertical and horizontal sweep circuits in cameras and monitors and synchronize the controls in VTRs..
- (2) - Switch-Fader: If fades, dissolves from one picture to another and super-imposition of one picture on another are desired, an electronic switcher-fader is needed.
- (3) - Special Effects Generator: This device is used to provide additional variations in programming, particularly the capabilities of having two scenes on the screen at the same time.
- (4) - Film Chains, Slide Chains and Multiplexers: This equipment makes it possible to televise films and slides with proper illumination across the entire surface. The multiplexer takes the images from more than one projecting source and multiplexes them into a single film camera.

## 2.5 - Software

In addition to actual electronic equipment in the CCTV industry, there are a wide variety of software skills available. A number of firms including Time-Life Video, Motorola, Video-record Corporation and a large number of youthful underground groups have announced plans to produce videotape tape programs to be played on home, institutional and industrial equipment. Opportunities will also exist for the training of individuals in the use of this equipment and to assist users in program creation.

There have been millions of words spoken and written about

elaborate plans for new and startling forms of video-player "software" but to date even among the firms mentioned, little has emerged beyond the predictable moves into instructional shows and the repackaging of old films, old TV shows and existing instructional films into forms suitable for CCTV use.

### 3 - MARKETS FOR CCTV SYSTEMS

The market for CCTV systems has been divided into five user groups each of which is discussed in detail in subsequent sections. Each market has quite different needs and applications for closed circuit television systems.

#### 3.1 - Community Antenna Television (CATV)

The past decade has seen an explosive development of community-antenna television systems. Canada is now the world's largest exploiter per capita of this system. The original purpose of CATV was to bring television reception to smaller communities which, for reasons of terrain or distance from transmitters, could not otherwise be served. The quality of local transmissions can often be improved by cable distribution. In addition, the public demand for alternative programming may also be satisfied. Today over a quarter of all urban households in Canada are served by CATV systems. It has been estimated that within twenty years with only modest improvements in cables and television sets, as many as eighty-two television channels or their equivalent could be available in the home for a wide variety of services.<sup>1</sup>

Operating revenue of the CATV industry in Canada, 1971 is currently over \$66.6 millions, a significant increase from \$22.1 millions in 1967.<sup>2</sup>

The number of companies engaged in cable television during the 1967 to 1971 period increased from 314 operating systems to 326 operating systems. A more significant increase was

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1

Canada, Report of the Senate Special Committee on Science Policy. A Science Policy for Canada. Ottawa: Information Canada, 1972, p. 344.

2

Statistics Canada, Cable Television. Cat. No. 56-205

in the number of subscribers. In 1967 there were 408,853 individual subscribers and 6,768 multi-outlet subscribers; the respective figures for 1971 are 1,082,379 and 14,147. The growth in cable television in Canada has thus been substantial. It is virtually impossible to predict at what point the saturation level will occur but many individuals feel that cable television hook-ups will be as commonplace as telephones within the next decade.

An American study predicts that revenues from the CATV industry will increase ten-fold by 1980.<sup>1</sup>

As CATV systems increase their number of subscribers, greater emphasis will be placed on the origination of local programming as opposed to the present widespread use of prerecorded material. This, of course, will necessitate greater investments in broadcasting equipment.

The level of equipment sophistication and picture quality will decrease along with decreasing subscribing size. Inexpensive equipment will be available to even the smallest CATV systems to provide scanning of information such as time, weather, a wire news service and stock market quotations. The largest CCTV system will be installing equipment of almost broadcast quality. Assets in equipment for many of these larger systems will easily surpass \$100,000. Estimates of the size of the CATV market for CCTV equipment in the United States are \$2.5 millions in 1970; 7.3 millions in 1975 and \$8.1 millions in 1980.<sup>2</sup> Canadian data are not available but a rule of thumb estimate of ten per cent of the United States market will serve as an approximate guideline. Thus an estimate of the Canadian market would be \$250,000 in 1970 growing to \$810,000 in 1980.

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<sup>1</sup> Frost & Sullivan, Inc. The Closed Circuit Television Systems Market. New York: Frost & Sullivan, Inc. 1971, p.75.

<sup>2</sup> Ibid - p. 82.

### 3.2 - Industry and Commercial

In the United States it is estimated the largest CCTV market is in industrial and commercial applications. At present there are four primary areas of business activity in which CCTV systems have compiled a significant record of successful problem solving:

- (i) - Training
- (ii) - Research and Development
- (iii) - Communications, and
- (iv) - Monitoring and Surveillance

#### (i) - Training

The use of CCTV systems that have incorporated videotape recorders has enabled firms to bring trainees into their future job environment without the necessity of causing disruptions in operations. The trainee gets a view of machine and procedural operators under close-up, one-to-one conditions. Portions of an operation that require special emphasis can be easily repeated.

#### (ii) - Research and Development

In research and development a CCTV camera is able to go places; to endure uninhabitable climates and cramped spaces; and to view developments consistently for longer periods of time than a human can.

#### (iii) - Communications

CCTV systems can enable top management to communicate simultaneously and in video with many parts of an organization. It means that new production, sales or



marketing data formulated at one company location can be disseminated and put into practice very quickly. One rather unique use is in the transmission of pictures of important documents such as stock certificates between branches of a bank so that important data can be verified.

(iv) - Surveillance

With the growth of crime in industrial and commercial establishments, a large market is developing for this type of CCTV equipment. Most of this market can be served by simple cameras and monitors. Major problems have been encountered in industry by the refusal of employees to allow installations of this type of equipment. An industry spokesman cited the case of a wholesaler who in an attempt to cut down on his annual shrinkage of approximately \$200,000 proposed to install \$40,000 to \$50,000 of CCTV equipment. His employees threatened to strike if the system was installed. The wholesaler cancelled the equipment contract.

Most of the CCTV equipment used by industry will be of the less expensive variety. Uses will be very diverse and thus a need will exist for the equipment manufacturers to be able to design CCTV systems that will meet the unique needs of an industry.

It is anticipated that industry will increasingly adopt this type of equipment for use in quality and process control. Equipment for these types of operations will require a high degree of sophistication.

Estimates of the size of the industrial and commercial market in the United States are:

\$45 millions in 1970  
\$70 millions in 1975  
\$136 millions in 1980

Once again Canadian figures are not available but using our rule of thumb the Canadian market would be:

\$4.5 millions in 1970  
\$7 millions in 1975  
\$13.6 millions in 1980

### 3.3 - Education

Great debate is regularly undertaken in educational circles as to the effectiveness of instruction using the media of television. Experimentation has not been extensive enough to yield conclusive answers and for the present closed circuit television instruction has its widest acceptance as a supplement and not as a replacement for existing school facilities. Much of the criticism of CCTV instruction is undoubtedly the result of the erroneous conception that closed circuit television can be used to record a rambling lecturer, babbling through his teaching period.

Equipment for instructional purposes runs from the simple to among the most complex depending on the size of the system. In its simplest form it may consist of a one classroom installation that is used in biology or chemistry class where the camera is coupled directly to a microscope so that the entire class can simultaneously view a process too small to be seen otherwise. On the other end of the scale are entire school systems linked to a sophisticated broadcast center with equipment of corresponding complexity.

Growth of educational uses of closed circuit television system is hard to forecast. It is highly dependant upon government spending and the purchasers as a group tend to be highly conservative. The costs of selling equipment to this group is also high as many sales demonstrations tend to be necessary because of the difficulties in locating the proper decision makers.

During the sixties when governments were investing heavily in educational equipment sales for CCTV systems grew rapidly. Schools placed orders without having clear ideas of how to apply the equipment. The problems connected with program creation and the operation and maintenance of the equipment were beyond the technical capabilities of the assigned staff. In addition, teachers did not know how to integrate CCTV with their teaching styles. As a result, there are schools with CCTV equipment that make little use of it today.

The market for closed circuit television systems in Canadian schools is estimated at 3.0 millions in 1970; \$4.0 millions in 1975 and \$6.0 millions in 1980.

### 3.4 - Home

The largest potential market for CCTV equipment is in home use. Many questions remain to be answered before the size of this market can be estimated.

Chief obstacle to the development of this type of system is the availability of a low priced VTR unit that can be adapted to standard television equipment. Use of cameras is not anticipated to have significant impact on the home market as do-it-yourself television programming is expected to have limited appear.

The VTR unit has numerous home applications, ranging from the taping of television programs to be viewed at more convenient times to the use of prerecorded highly specialized video cassettes for use in home study programs. The possible uses and opportunities for software appear sizeable.

As discussed in a previous section many firms are in the process of test marketing a variety of equipment for home use. Estimates of sales in the United States vary from a high of 20,000 to about 2,000 units for 1972. Units presently on sale are priced at about \$1,450 without the

camera and thus cannot be classified as a mass market product. At the present time no major Canadian retailer is marketing these products although several units have been displayed by retailers.

At this stage of product development, market size is impossible to predict. Many television manufacturers are gambling that home CCTV systems will provide them with a new market of size similar to the color television market. Although Canadian sales of color television sets remain strong, in Japan sales have levelled off and some Japanese firms believe that home sales of VTR equipment will be necessary to stimulate growth in this industry. About 80% of Japanese homes are estimated to possess colour television as opposed to 30% in Canada.

### 3.5 - Other Uses of CCTV

Two other major areas of CCTV application presently exist: medicine and government.

The closed circuit television camera is gradually being incorporated into the design of modern hospitals as a means of improving efficiency and reducing cost. Hospitals have found that a surveillance system that can view patients from a remote position serves as a valuable adjunct to nursing care in the acute and critical areas. Another area of use in the hospital is to promote patient-visitor communications in special cases where no visitors are allowed.

This market has been estimated at approximately \$600,000 in 1970, \$800,000 in 1975 and \$1.2 millions in 1980.

All levels of government are potential markets for closed circuit television. CCTV systems have been used successfully in law enforcement, for traffic surveillance, for monitoring activity in subway systems and for surveillance in post offices. As in industry, the use of closed circuit tele-

vision could in government communications be used as a substitute for travel.

On the bases of the Frost & Sullivan study the Canadian market for closed circuit television equipment for government use is estimated at \$700,000 in 1970, \$1.4 millions in 1975, and \$2.4 millions in 1980.

### 3.6 - The Canadian Market Potential for Closed Circuit Television Equipment

Great caution should be used in evaluating the estimates of markets for closed circuit television equipment. Without even an indication of the present size of the Canadian market, it is very dangerous to be projecting future demand. Table 3.1 summarizes Canadian markets by user based upon United States data.

In summary, the potential market for this type of equipment appears substantial. There will undoubtedly be sizeable increases in the use of CCTV equipment. The big question remains the home market which could potentially surpass the total for other markets.

In addition, there will be sizeable opportunities for firms in the software side of the industry. The size of this market is impossible to predict using present data.

TABLE 3.1

ESTIMATED CANADIAN MARKET FOR CLOSED  
CIRCUIT TELEVISION SYSTEMS  
(\$ millions)

	<u>1970</u>	<u>1975</u>	<u>1980</u>
CATV	.2	.7	.8
Industry & Commercial	4.5	7.0	13.6
Education	3.0	4.1	6.0
Home	?	?	?
Other	1.3	2.2	3.6
	<hr/>	<hr/>	<hr/>
TOTAL	9.0	14.0	24.0

4 - CANADIAN PRODUCTION

At the present time there are no major producers of CCTV equipment in Canada. Virtually all equipment is supplied by American, Japanese and European manufacturers. The major firms engaged in this industry are listed in Table 4.1. Of these firms Ampex, Diamond Power, General Electric, RCA, Philips, Shibaden and Sony are most active in Canada at the moment. These firms all participate in the traditional markets for CCTV systems. Some of these firms are also engaged in the development of home units. The major participants in the development of home units are mentioned in the previous section on video tape recording equipment.

In North America, Japanese companies dominate the lower priced end of the market. The unsophisticated surveillance equipment market is also exclusively Japanese. They have made substantial gains in other CCTV markets as well.

Video tape to be used in this equipment is also not manufactured in Canada. Imports of video tape reached \$3.6 millions in 1970, up substantially from \$1.0 in 1966.

The software side of this industry is well represented in Canada with a great many small firms specializing in systems design and film making for educational, industrial and other users of closed circuit television systems.

TABLE 4.1

MAJOR COMPANIES ENGAGED IN  
THE CCTV EQUIPMENT INDUSTRY

<u>Company</u>	<u>Origin</u>
Ampex	U.S.A.
Ball Bros	U.S.A.
Conrac	U.S.A.
Diamond Power	U.S.A.
Dynair Electronics, Inc.	U.S.A.
Educon	U.S.A.
General Electric	U.S.A.
General Precision Ltd. (Singer)	U.S.A.
GTE Sylvania	U.S.A.
International Video Corporation	U.S.A.
Motorola	U.S.A.
Panasonic	Japan
Philips	The Netherlands
R.C.A.	U.S.A.
Riker	U.S.A.
Telemation	U.S.A.
Shibaden	Japan
Sony	Japan



5 - POTENTIAL FOR CANADIANS IN THE CLOSED  
CIRCUIT TELEVISION SYSTEMS INDUSTRY

The closed circuit television field has no shortage of manufacturers. Of the two markets for existing equipment it would appear that Canada has no major advantages that would make a Canadian producer competitive. At the upper end of equipment in terms of sophistication, European and American firms have the necessary skills. Highly sophisticated equipment requires the special skills that are available in these countries, but which are not available in Canada. Some equipment in this range is custom built to meet the highly specialized needs of customers. As Japanese manufacturers increasingly make inroads into the lower priced equipment areas, more firms will likely concentrate on the upper end of the market which is already highly competitive.

The larger market for lower priced and less sophisticated equipment will be increasingly dominated by Japanese producers. This phenomenon has occurred in virtually all areas of the electronics industry, with Canada being unable to compete.

One exception to this statement is the manufacture of mini-calculators in Canada. But in this field Canada has been able to develop the equipment that requires a smaller labour input than Japanese models and has thus been able to produce a highly competitive product. Another exception is Microsystems International Ltd., a company which is engaged in the production and international marketing of microelectronic systems. However, in order to remain competitive in world markets, Microsystems is establishing a plant in Penang, Malaysia.

The major advantages for Japan have been its lower labor costs and high level of technical ability. Admittedly, with the revaluation of the Yen and the increases in labor costs in Japan, this advantage has been somewhat lessened. In addition, Japan is counteracting this situation by establishing plants for the manufacture of electronic components in low price labour areas such as Taiwan, Korea and Venezuela. The establishment of assembly plants in other countries to avoid high tariffs is also occurring as

in the case of the television industry in Canada. Matsushita, Sanyo and Hitachi have all established assembly plants in Canada for this reason.

Even with a general tariff rate of 25% and a most favored nation rate of 15% for this type of equipment, it is unlikely that a Canadian producer could enter this highly competitive and rapidly changing market and survive. Canada has neither the technology nor type of labour force that are necessary.

On the software side, there does appear to be an opportunity for the training of individuals who can competently design and install CCTV equipment systems. Several industry spokesmen expressed the feeling that even though there are a great many people engaged in CCTV system installation, most of them tend to be of the television repairman type who sell and install equipment as opposed to properly designed systems.

The big opportunity in the CCTV industry may be just developing the home market. It is based upon the development of a new technology. Basically it involves a low-priced video-player, which may also be a video-recorder and which when connected to the antenna terminals of a television receiver will reproduce a prerecorded audio-video program.

A basic question that will need to be asked however is what human needs or wants will video-players satisfy, and so cause people to spend money on them?

The video-player, like a phonograph, would allow personal program selection at any time. Its advantage relative to television or CATV is that it is free from CRTC regulation and the restraints imposed by a mass audience. A small, highly specialized market appears to be the potential audience. This means that programming for video-player systems will have to be different, but at the same time inexpensive. Certainly the video-player industry is not likely to compete with commercial television. Television programs are free and video-players would have a dim future if they offered only programs already available on TV without the extra cost of the video-player and tapes.

With the millions of dollars being spent of the VTR hardware you would anticipate sizeable amounts being devoted to the creation of VTR program libraries, but this is not the case. In the development of color TV it took RCA several years and many millions of dollars devoted to underwriting color TV programs, to spur the sale of color television. The present situation in the home equipment market, "seems almost like making razors without supplying razor blades."<sup>1</sup>

Another serious problem is the lack of equipment compatibility. None of the major VTR systems described in an earlier section is compatible with other systems. In addition, among systems that use videotape as opposed to discs there is no agreement of tape standardization. An exception to this is the Japanese manufacturers who have agreed to use a 1/2-inch wide magnetic tape with a playing time of approximately 60 minutes.

Another large grouping of compatible magnetic videotape systems is spearheaded by Norelco's Video Cassette Recorder. VCR is a 1/2-inch system but is incompatible with the Electronics Industry Association of Japan type 1/2" machines. Among those subscribing to the VCR standard are Bosch, Blaupunkt Nord Mende, Grundig and Telefunken. A Japanese firm Shibaden has agreed to represent the VCR format in efforts to win EIAJ approval.

A major competitor also looms on the horizon for home CCTV units. The threat is cable television. CATV will increasingly be capable of offering programs for specialized audiences and will no doubt use VTR technology to provide program material. Perhaps on CATV a viewer may not get exactly what he wants when he wants it. But if the cost differential between two

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Holm, U.R. "Socio-Economic Aspects of Video-Player Systems - A Prespective", Journal of the Society of Motion Picture and Television Engineers. March, 1972, p. 155.

choices is large it is amazing how much inconvenience can be tolerated by a viewer.

With the technology available for the offering of eighty-two channels a great many highly specialized forms of programming will be possible. Technology is also under development that will be able to provide demand programming on the CATV system.

What prospects are there for Canadians if the home units should be successful? At this stage of development it would seem that Canada is too late to enter the field and gain the advantage of cumulative experience. If a Canadian manufacturer is to supply this equipment at all, it will be in conformity to the specifications of a foreign firm. The options open to the Canadian manufacturer will be to copy or not to manufacture at all. Two Canadian manufacturers, Electrohome Ltd. and Canadian Westinghouse Ltd. have already made arrangements to manufacture RCA's SelectraVision system.

At present it appears that a spectacular shake-out is going to occur among the firms competing in the development of the successful home unit. Already one major participant, Ampex, has withdrawn from the market and others are expected to follow before home CCTV systems reach the mass consumer market. Some viewers of the industry believe that CATV has already made home CCTV systems based upon video-players and recorders obsolete.

6 - CONCLUSIONS

Based on current information, one cannot justify the participation of a Canadian entrepreneur in the closed circuit television equipment industry. This situation may change if a viable market is created for home equipment. For this type of production it would be anticipated that several of the twelve current manufacturers of television will seek licenses to manufacture foreign designed equipment for the Canadian market. As is presently the case in this industry, a large percentage of the necessary components will be imported from low-cost production areas such as Mexico, Korea and Taiwan with only assembly occurring in Canada. No new Canadian producers should be encouraged because Canada already has too many producers of television. With a much smaller market, Canada has twelve producers of television, as compared to seven in Japan and nine in the United States.

Before home units develop a mass market, a large "shake-out" will be necessary in the industry with one type of standardized unit becoming the victor. The effect of CATV on this market is also not clear.

Opportunities appear to exist in the software side of the industry for people who are properly trained to install and market equipment suitable to the needs of the present users of CCTV equipment.

The designated regions of Canada appear to have few opportunities for participation in this industry. The major area of opportunity is in the software side of the CCTV industry. The product demand is service. This normally necessitates that companies offering this product should be located close to their customers, the majority of whom will be found in the major urban centers of Canada. If home units become feasible the present manufacturers of televisions, none of whom are located in designated regions of Canada, will be the likely participants.

The close circuit television industry merits future analysis. The present level of development makes it difficult to arrive

at an accurate description of its potential. The conclusions reached in this study are believed to be accurate assessments. However, as it became apparent in the process of completing this study, the CCTV industry changes daily. The closed circuit television industry merits further analysis, as it may develop into one of the major growth industries of the late seventies.

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