

Draft Proposal for introducing  
Concept of Basic "Low Vision Service",  
Low Vision Assessment & Prescribing Kit and  
Utilisation of Existing Human Resource for  
Creating awareness, Increase Coverage and availability  
in order to achieve targets of



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## How I was attracted to programme on preventable blindness A wonderful experience...

**Back ground:** - Incredible but true About 4-years ago a news item was published in Times of India, that a near blind person can read with an instrument developed for "NASA". It was really fascinating news. This was totally against the prevailing belief that a blind person cannot see. I tried to collect information from various sources and the concept of "Low vision" was rooted in my mind.

Being a **Rotarian** I am actively involved in community service projects I took this as a challenge and a new opportunity of service. The experiences while developing various devices were narrated in one book, this book received appreciation from Rotary International ABTF. This gave me further encouragement.

My attention was attracted to a stunning information that-- " 80 % legally blind people can perform their day to -day activity, IF proper visual device is made available to them." Vision is very important sense and if a visually impaired person can get back this marvelous power by a simple means of identifying proper device, why people are not doing this? I noticed an important fact that even in developed nations there is no awareness about using Low vision devices.

**The news item indicated the cost was about 6000 US\$. Considering financial capacity this was out of reach of a common person from India or any other developing country, where there is maximum need. I also realized the need to produce low vision devices in low cost.**

My family members, friends and other associates, thought the seriousness of this problem and decided to work to help visually impaired people. This group includes optical goods manufacture, Ophthalmologists, mechanical engineer, electronics engineer etc. So all expertise was available. A registered charitable trust is formed under the name "Vijaya Memorial Trust". The approach was formulated to give basic Low vision service as it was most needed and easily possible with our resources.

The development of various LV devices and demonstration at Arvind Eye Hospital, Madurai. Created a new opportunity - An invitation to attend "Asia Pacific Regional Workshop on Low Vision". The correspondence with Dr. Pararajesgaram and Dr. S. Resinkoff of World Health Organisation also gave encouragement for our efforts. The information obtained by participating the workshop was very useful and I wish to share my experience with others.

PUNE, 24<sup>th</sup> November, 2001

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## **Adaptable technology for “Low cost visual devices”**

**1.1 Introduction:** It is said that sight is next to life. We are visually oriented from birth. 75% information and knowledge we get through this important sense. So powerful is the vision in our life, but millions of people are deprived of this power and are unable to perform day to day activities. In order to drastically reduce the global burden of blindness, which currently affects an estimated 40--45 million people worldwide, and 110 million of low vision, the World Health Organization (WHO) and a broad coalition of international, non governmental and private organisations launched on 17<sup>th</sup> Feb, 1999 in Geneva a global initiative "VISION 2020: THE RIGHT TO SIGHT". The objective of the new initiative is to eliminate avoidable blindness by 2020.

**1.2 Problem:** Despite decades of traditional service delivery initiatives, the vast majority of the world's blind and visually impaired individuals remain without special services and resources to help improve their opportunities for attaining equal rights, personal independence, increased quality of life, and maximum potential within their families and their communities. In India there are about 12 million blind and 28 million visually impaired people. The scale of problem and the waste of human ability and dignity is so enormous that those who are positioned to assist them are often equally unaware of what they can do to help. Innovative outreach strategies are urgently needed at the grass root level – strategies that emphasize self-help, self esteem local community and family action.

**2.0 Solution:** Organisations like Sight Savers International, CBM, Lighthouse International and other many trying to develop proper service module for “low Vision Service. Vision 2020 also has proposed three pronged strategies. The main points to be considered are Awareness, Availability, Accessibility and affordability. On this background Unique Educational Equipments, PUNE --India. Has developed a kit for getting access to education, entertainment or rehabilitation of visually impaired persons. We have considered affordable cost, large manufacturing capacity and easy availability while designing the kit.

**3.0 The kit and magnifiers:** Magnification is the only solution to many vision problems. This can be achieved by using optical and electronic magnifiers. We must consider various properties of magnifier and some technical terms in order to get maximum benefit. (Annexure “A”)

**4.0 Properties of Magnifiers Important for Low vision application :**

- ❖ **Field of view** – Sizable field of view is requirement of LV application
- ❖ **Magnification** – 2x or more required. Up to 20-30X CCTV system
- ❖ **Working distance** – Should be able to do task properly.
- ❖ **Mechanical configuration** – hand held or stand / spectacle mounted.

**5.0 Types of Magnifiers:** We have use Fresnel lenses, Aspheric lenses, and prismatic lenses and CCTV system to cover about 85% requirement.

. **Increase magnification is possible with some special magnifiers, associate unit of Unique Educational Equipments develops the production technology of these magnifiers and these magnifiers are available for "Low Vision Patients" at economical prices.( Details in Annexure - B )**

**Use of Appropriate Technology:** Appropriate technology can be defined as " Finding technically, economically, socially and environmentally viable solution for technical problems"

India formulated its own approach to technical development and technology policy by giving thrust on SSI units for production of specific items. Power generation, Transportation- railways and other infra structure development was reserved for Govt. sector. By implementing three consecutive industrial policies to day we have created a strong and sound base for industrial production. Though India itself is a developing country, we have been able to completely overcome our food problem by achieving some major breakthroughs in the field of agriculture. We have been able to create a fairly strong economic and industrial base, a well-trained industrial force and a large pool of scientists, engineers managers and technicians, capable of harnessing and adapting modern technology to large-scale industrial and commercial use. A good deal of conscious effort was made to tap all possible indigenous sources of material and men, which has enabled the country to achieve substantial level of self reliant industrial development, capable of exporting not merely raw materials but finished and intermediate products. The country has also done pioneering work efforts in developing intermediate and appropriate technology to suit the needs of developing countries.

### **Concept of "Basic Low Vision Service"**

**What is Low vision service? - When conventional eye-glasses or contact lenses can no longer help and surgery or clinical treatment is not appropriate, then it is time to consider "Low Vision Devices " Many patients are told that "Nothing more can be done" for their sight. This is quite often not true, many patients with AMD, diabetic retinopathy and few other disabilities can be given useful vision for specific task by using proper low vision device. Low vision in children and elderly should be treated separately, This type of service is not commonly available in India. If it is made available, it can change quality of life of a VI person.**

**World Health organisation recognizes vast gray area between normal vision and blindness. This area came to be known as "Low Vision". Low vision care is an important and specialized eye care service by optometrist and general public is not familiar with this. This is a comparatively new subject in most of the developing countries and even many ophthalmologists are also not aware of the profound benefits a visually impaired person can derive from LV service.**

**Global estimate of visually impaired-** 35 million are in need of low vision care. This figure of 35 million is rapidly increasing as average life span is increasing. "Refractive errors and low vision" is a prominent area where rehabilitation of visually impaired persons can be done easily and 80% legally blind can perform some daily routine if proper visual aid is provided.

**Asia Pacific regional workshop on Low Vision** –An international workshop on "Low Vision Care in the Asia-Pacific" was convened within the framework of "Vision 2020 - the Right to Sight" in Hong Kong. Vision 2020 The Right to Sight is a global initiative that aims to eliminate avoidable blindness by 2020. It was hosted by the Hong Kong Society for the Blind, co-sponsored by the World Health Organization, and supported among others by the International Agency for the Prevention of Blindness Task Force for Vision 2020, Sight Savers International, Dark and Light, International Eye Foundation and the Hong Kong Society for the Blind.

The Asia-Pacific Region includes three World Health Organization / International Agency for the Prevention of Blindness Regions (part of the Eastern Mediterranean, South East Asia and the Western Pacific); is home to half of the world's population and has a disproportionate share of the global burden of visual disability. **It is an alarming fact that in respect of low vision care, less than 5% of the population are presently covered in this part of the world.**

**In conclusion, it was stressed that there was a great and urgent need to expand access to low vision care and that it should be an integral part of health, educational, rehabilitation services and should be included in the national program planning for Vision 2020. There was a strong need to identify and train appropriate personnel for the delivery of these services, and it was emphasised that the feasibility of establishing low vision care would depend on the use of appropriate technology for the production of low vision devices.**

On this background there is tremendous potential for INDIA to provide appropriate technology for production of low vision devices as well as services to all developing countries. The organisations like Rotary or Lion's can undertake projects through the clubs easily."

**We are interested in executing projects in establishing Optical and Low vision service centres. We have fairly large capacity for production of Glass and plastic magnifiers and a trained force of Volunteers. We have registered a charitable trust for giving special service to visually impaired persons and through this we can undertake service projects.**

**Any Individual, organisation etc can contact us for further details on following address.**

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## ANNEXTURE - A

### A. Basic kit - optical magnifiers (Most essential for initial assessment)

1. **Directory reader** - A simple plastic cylindrical lens use to read small print.
2. **Fresnel Book Magnifier**- A post card size thin magnifier with 2X magnification and 90x160 mm field of view, most suitable for reading books and news paper.
3. **Hand held Magnifier**- 3 inches dia., plastic lens (5D and 15D bi- focal). It is provided with special handle to hold firmly on paper.
4. **Illuminated hand held magnifier**, 32mm square lens.(12D)
5. **Stand magnifier**- glass lens mounted on plastic stand. (10D)
6. **Cut away stand magnifier**- A compound plastic lens 6x , (28D)
7. **Prism spectacles** - for slightly shifting the image- available in 3 powers
  - a) +5.00 Sph. with 3.75 degree prism.
  - b) +6.50 Sph. with 4.25 degree prism.
  - c) +9.50 Sph. with 7.00 degree prism
8. **Aspheric spectacles** with 16D and 20D for large magnification requirement.

### B. Optional - Equipments

Proper lighting can be a critical line between success and failure in case of LV patient, Therefore a magnifier giving binocular vision and proper lighting is included in the kit

1. Flexible arm illuminate Magnifier - Proper lighting is the essential requirement for LV patient. This magnifier is very versatile and useful for all application. 125-mm lens gives binocular vision.
2. Neck Magnifier - with large field of view and convenient to use, 3D lens.

### C. CCTV system with 14" B/w monitor and reading attachment.

### 2. Sugestions / information for using Diagonostic test kit for visual function assesment.

- ❖ (1) Aspheric lenses will give large magnification for monocular use, without any distortion. Prismatic lenses will give medium magnification for binocular vision. illuminated magnifier will give correct illumination, Fresnel lens is a lighter lens with good field of view.
- ❖ (2) All these magnifiers will practically help to 90% of the patients
- ❖ (3) CCTV gives very large magnification it is a good device to create confidence in patient that he can read.

## ANNEXTURE -B

**A. Fresnel lenses** - In 18<sup>th</sup> century a french scientist Augustine Fresnel invented this type of lenses. The main advantage is large aperture lens is available in flat sheet form - light in weight and having amazing power. We have these lenses in 4 different sizes with suitable stand for hand free working.

### **B. USE OF ASPHERIC LENSES FOR LOW VISUAL ACTIVITY**

Persons suffering from LVA require significant magnifications as well as considerable field of view. In order to be able to read printed matter. To get these properties of a magnifier one needs to use lenses of high dioptric powers, generally ranging from 12° D upto 30° D.

Normally, ophthalmic lenses have spherical surfaces, as they are the easiest and most economical surfaces to generate. Unfortunately, all spherical surfaces suffer from an inherent optical defect called spherical aberration. Fortunately, this defect remains insignificant upto a lens power of 12° D. But for powers beyond 12° D the spherical aberration rapidly reduces the effective field of view, thus making the lens useless for all practical purposes as Low vision device.

In case of single lenses as used in spectacles, the only method available for eliminating spherical aberration is to go for aspheric surfaces. Unfortunately, aspheric surfaces are very difficult and expensive to generate. It would certainly not be feasible if each aspheric lens were to be manufactured individually. The solution to this problem, therefore, lies in the technique of generating aspheric surface. This technique is now well developed in India and now it is possible to provide such lenses at competitive price.

**C. Prismatic Spectacles** - When centre portion of the retina is damage, a theoretical alternative is to move the image onto an adjacent healthy area of the retina, using a prism lens mounted in a spectacle. It is possible to shift the magnified image slightly, in some disabilities this is useful, We have four different powers in this type. They are either spectacle mounted are in a headband with hood.

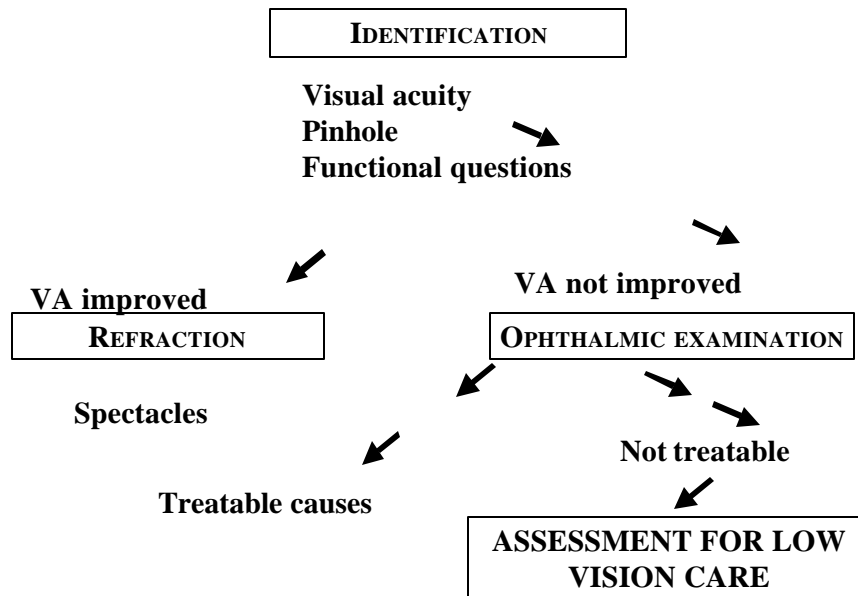
**D. CCTV System** - This is a very useful device as the magnification is very high and no problem of viewing at a focus point like optical magnifier. We can use this to create confidence in the patient's mind and also use as a tool to teach ALFABETS etc, to a visually impaired patient.

# PROPOSED "LOW VISION SERVICE" PROJECT

## OBJECTIVES:

1. To introduce "Low vision assessment and Prescribing kit" to primary health centres, Eye care professionals, and various Institutions/ Hospitals, and create facility for training to use LV devices. (Existing eye care centres can be provided this kit In order to make service accessible at reduced cost)
2. To established supply/ stores at 3-4 places in India for dispatching/ providing Low vision devices ex-stock or by mail order easily and at affordable prices.
3. To create awareness in community about the "Low vision Service"

There are 28 million people in need of Low vision care but with existing resources and facilities we can reach to (maximum) 3,00,000 people only. Therefore, It is suggested that we should follow the guidelines given by World Health Organisation in order to achieve targets of " Vision -2020 Right to Sight "



To identify or prescribe the suitable device, no equipment is readily available in a developing country like India. World Health Organization had recommended that low vision services be established and strengthened in a phased manner, starting with basic services using appropriate technology.

The Low vision service consists of four components viz.

- Identification,
- Prescription of LV device,
- Procurement of Device,
- Training /counseling.

2. Prescription of LV Device: The objective in prescribing LV device is to enable low vision patient to use his/her remaining vision effectively and efficiently. Prescribed LV device are to overcome the visual impairment to avoid visual disability.

The kit manufactured by us can be used for majority of causes of Low vision. The Optical principals used and information about magnifiers given in **Annexure - A**. Such kit was not available and can be easily use by simple training.

**.Vision Screening** - The most ideal starting point is screening of school children. It is our experience that 7 or 8 minutes require per student and considering number of students in a class it is difficult to check them by Ophthalmologist.



**Preliminary Kit:** This will consists of Pinhole spectacles, E charts and two instruction manuals. By using this kit Teachers or Office staff can identify students who really require Examination from Ophthalmologist. By this method coverage and accessibility can be increased with existing resources.

**The basic kit also can be used by any person with little training.** The kit consists of various magnifiers from lower powers (4D) to higher (28D) and different types viz. Cylindrical, Spherical, Prismatic, Fresnel and Aspheric, Made from glass as well as plastics. The magnification range covers from 1.5X to 7X. Most of the requirement of LV application is covered in this range.

The patients with macular degeneration or other severe disabilities require more magnification, this can be given by CCTV system. Proper lighting is also important factor, Therefore specially designed flexible arm magnifier is incorporated in the kit.

The kit can be supplied for convenience in Module form i.e. in parts A+B+C

**NOTE: - Every magnifier has special function the details are given in annexure**

**3. Procurement or Provision of LV device:** We propose to create a mail order stores by which suitable device can be supplied/ provided in a very short time. The important point is that the design of kit is done by considering special needs of developing countries. (i.e. Low cost, large manufacturing capacity and appropriate technology) The individual devices can be produced on mass scale at a very affordable cost and therefore easy availability can be established. The material and Technology used is Indigenously developed. The Quality and price both are very competitive.

**4. Training and Counseling:** The cost of the individual devices is not very high, therefore training facility can be created at the centre itself. While giving training attention to some other important factors, such as Lighting, Viewing distance etc should be considered. We propose to give sufficient trial before actual purchase of the device.

**The solution to majority visual problems is MAGNIFICATION and this can be achieved by different ways The possible approaches are -**

- ◆ **Increase the size of the object - Large print books or Plus lens.**
- ◆ **Decrease the viewing distance - Reading stand.**
- ◆ **Telescopic Magnification - Use of Telescope.**
- ◆ **CCTV system**

The proper identification/ prescription can be a tool for education, with some magnifiers we can convert N8 normal type to N25 which is a large print size. Many students can start reading normal print instead of Braille.

Senior citizens can have Access to Entertainment as reading or watching TV will be easy -these factors can change the quality of life of a visually impaired person. So far visual disability due to aging is not considered though it is an inevitable reality. By simple device this can be corrected.

## **“MAGNIFIER” AN INDISPENSABLE VISUAL AID For Low Vision Patients**

Magnification of image is the solution for low vision problems. This is achieved by optical or electronic magnifier. To decide upon correct specifications of the magnifier it is necessary to understand various properties and technical terms of a magnifier.

A Perfect Magnifier would have high power, large area, light weight, high working distance and crystal clear, distortion-less magnification. But a perfect magnifier incorporating all these properties is impossible as per the basic laws of physics. You have to give up an advantage in order to gain another. In case of Low vision application field of view, magnification and working distance are important factors.

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**1 . MAGNIFICATION** : Is the number of times an object will look bigger when viewed through the magnifier. with increasing magnification you will be able to see more and more fine details of the object being magnified. But there will be a corresponding decrease in all the other properties mentioned below, Your aim therefore should be to go for the lowest magnification that will still enable you to see all the details you need to see in your given application.

**2 . FIELD OF VIEW** : Is the area or size of the object that you will be able to see through the magnifier. Field of view declines rapidly with increase in magnification.

**3 . WORKING DISTANCE** : Is the distance that has to be maintained between the magnifier lens and the object being viewed in order to keep the object in sharp focus. This is an important property if your work involves use of tools on the object under magnification.

**5 . DEPTH OF FIELD** : Is the distance between the closest and farthest points (on the objects being viewed ) at which the magnifier remains in focus. For example if you are viewing an uneven surface or a three dimensional solid object of field will not be able to keep the entire object in focus at the same time.

**6 . EYE RELIEF** : Is the maximum distance you can keep the magnifier from your eye and yet get to see the magnified image of the entire object. Larger eye relief provides greater viewing comfort to the user. Eye relief also generally goes down as the power of the magnifier goes up.

**7 . MECHANICAL CONFIGURATION** : Finally depending upon your requirement you should decide about this aspect- whether stand mounted, Hand held or spectacle mounted.