

# Instruction Manual

## Vision Screening with the Keystone View DVS-V GT Model # 1164

) H E



[www.keystoneview.com](http://www.keystoneview.com)

# Keystone View DVS-GT Table of Contents

Table of Contents . . . . .	2
Introduction . . . . .	3
The Keystone View Screening Instrument. . . . .	4
Elliptech Hand Control Unit. . . . .	5
Conducting the Screening. . . . .	6
Keystone DVS-V GT Screening Overview. . . . .	7
Screening Questions and Referral Guide. . . . .	8
Keystone DVS-V GT Maintenance. . . . .	12
Equivalency Charts. . . . .	13



**IMPORTANT NOTICE:** The instrument is held closed by a magnetic latch. To free the latch, place thumbs on top edge of base and press up on bottom of chassis (see illustration).

**DO NOT** lift up on black eye-shield assembly.

# Introduction to Keystone View DVS-V GT

## The importance of driver vision testing

After nearly 50 years of producing screening instruments for driver licensing agencies worldwide, **Keystone** View developed the first driver vision screener with glare testing capabilities for the Department of Transportation in Nova Scotia, Canada. Glare recovery is the ability of the eyes to quickly re-adapt to darkness after encountering a sudden, bright light. Example: An individual drives down a dark road and is visually struck with the high-beam headlights of another vehicle. The eyes' pupils, wide open to gather in the sparse light of night conditions, are now flooded with the glare of bright lights. Glare recovery is the speed and efficiency by which the individual's pupils re-adapt to night conditions. This crucial, real-life visual function is often overlooked, yet it is vitally important whether a person is steering a 2-ton vehicle at speeds over 70 miles per hour or driving a family vehicle on a neighborhood street at 15 miles per hour!

Keystone's glare recovery test gauges a subject's ability to adapt to decreased illumination and to recover from exposure to glare from bright light as a driver might experience under night driving conditions. Note: *No official standards have been set for glare recovery. Thus, failure of this test by a screening subject should be reason for concern, but not the sole reason for denial of a driver's license.*

### Features and Capabilities

All Keystone's DVS-V GT 8 stereotargets are presented at Far Point only. In addition to the glare recovery target, the instrument includes stereotargets for international sign recognition (US and UK signage only), depth perception, phoria, quick acuity, color discrimination, and in-depth acuity.

- Rapid Acuity Test 1 screens the right and left eyes separately and together at 20/40 (6/12) for clarity of details.
- Color Vision Test 2 checks for mild and severe color discrimination
- Horizontal and Vertical Peripheral Fields Screens for ability to identify objects in perimeter visual spaces while looking straight ahead.
- Depth Perception/Sign Recognition Test 3 tests for the ability to locate objects (cars, people, etc.) in space with regard to where a person is, some objects being closer or farther than others.
- Acuity Tests 4, 5, and 6 screen the right and left eyes separately and together at 20/20 to 20/200 (6/6 to 6/60) for clarity of details
- Phoria Test 7 screens for balance and coordination of eye muscles
- Glare Recovery Test 8 checks the ability to adapt to decreased light conditions and rapidity of recovery from exposure to bright light.

# The Keystone View Screening Instrument

The Keystone View DVS-V GT is designed for both standardized and completely confidential testing. Targets are enclosed in the unit, so subjects cannot see or study them in advance. Internal target illumination ensures consistency of operating conditions, and the unit pivots through a 63° arc to adjust to the eye level of any subject.

Only 10 inches (25 cm) wide, 15 ½ inches (39 cm) long and 7 inches (17 cm) high, the Keystone DVS-V GT is compact and completely self-contained. When not in use, a magnetic catch holds the unit closed. Total weight is less than 11 pounds (5 kg). The Keystone DVS-V GT operates from standard 110 or 220 volt a.c. power.



1. **Headrest:** Accommodates a wide variety of eyeglass frames. During testing, the subject's forehead should rest lightly against this specially-designed strip.
2. **Peripheral Vision Test:** Horizontal peripheral vision fields are measured using light-emitting diode target lamps, positioned between the lenses and recessed in the temple areas of the viewing head so that eyeglass frames will not interfere with testing. Vertical peripheral vision is measured by illuminating LEDs above and below the nasal area.
3. **Elliptech Hand Control Unit:** By pressing appropriate buttons, the examiner can advance or reverse the test targets, occlude either of the subject's eyes and control target illumination. Designed for hand-held or desk-top operation.
4. **Power Switch:** The off-on power control is located on the rear of the instrument.
5. **Power Supply:** To eliminate electrical and heat hazards, power is converted to 12Volts DC. To ensure safe operation of the equipment, the instrument must only be used with the transformer supplied by the manufacturer. Use of any other transformer that has not been approved by the manufacturer could result in safety problems.

INPUT: 110 or 220 VAC OUTPUT: 12 VDC

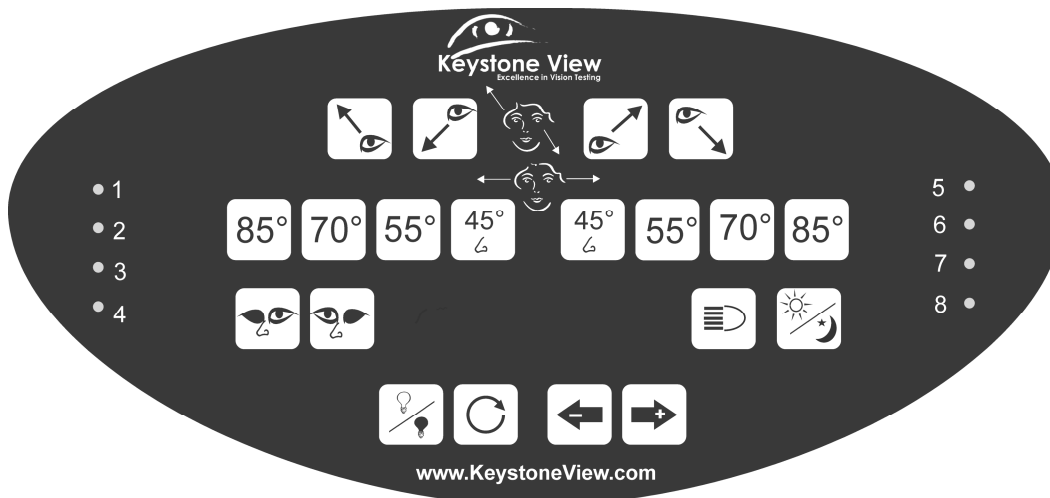
The Class II symbol on the transformer label indicates that the transformer not only relies upon basic insulation to protect against electric shock, but has double insulation as an additional safety precaution, there being no provision for grounding or reliance upon installation conditions.

**Environment**      Operating temperature 0°~40°C      Storage temperature -20°~70°C

**Symbols**



# Elliptech Control Unit



1 Lists active target (test slide) number. A lamp next to each test label indicates the target being presented.

85° Illuminates horizontal peripheral vision target lamps. A signal lamp indicates the eye and angle being tested.

Illuminates vertical peripheral vision target lamps. A signal lamp indicates the eye being tested.

Occludes (darkens) left eye.

Occludes (darkens) right eye.

Activates glare lighting.

(De)activates reduced illumination/night vision conditions.

Head sensor override button (off/on) allows operation of the machine without sensor activation by examinee's head. Eliminated on some models.

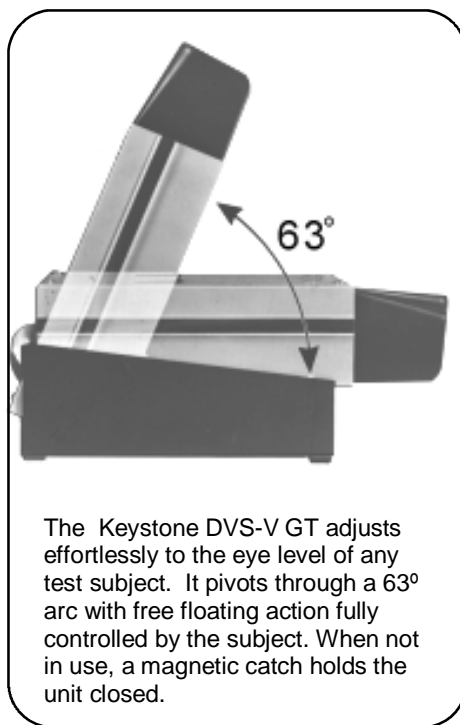
Resets drum, lights and lenses to original setting.

Reverse to previous stereo target.

Advance to next stereo target.



Target drum and illumination lamps, are readily accessible by removing the top cover of the case. The drum accommodates eight permanently-mounted stereoscopic tests which may be removed if required under special circumstances.



The Keystone DVS-V GT adjusts effortlessly to the eye level of any test subject. It pivots through a 63° arc with free floating action fully controlled by the subject. When not in use, a magnetic catch holds the unit closed.

A convenient storage area, accessible from the rear, is built into the base of the instrument. The instruction manual and extra record forms may be stored here when the Keystone DVS-V GT is not in use.

Accessible on the rear panel of the Keystone DVS-V GT are:

- The main power switch "on/off"
- USB connection port
- Main power receptacle

# Conducting the Screening

## Screening Preparation

The Keystone DVS-V GT screening should be given in a reasonably quiet area to avoid distractions and interruptions that may interfere with the accuracy or speed of the examinations. Subjects should be admitted from the waiting area into the test area one at a time to prevent those waiting to be examined from overhearing spoken comments or remarks that could impact the validity of their examinations.

Position the Keystone DVS-V GT unit near the edge of the table or counter at a height that allows for a comfortable testing duration of subjects in an average height range. The examiner can stand or sit anywhere in the immediate vicinity of the subject that provides comfort and sufficient working space.

## Equipment Readiness

At the beginning of the work day, dust the Keystone DVS-V GT and lenses with a soft, alcohol and water-dampened cloth and examine the unit using the following checklist:

- Is the unit transformer connected to a standard outlet? Do both target illumination lamps light up when the power switch is turned on?
- Do the horizontal and vertical field target peripheral lamps light up when the appropriate buttons on the control panel are selected?
- Does the appropriate target illumination lamp go out when each of the “occlude” buttons is selected?
- Do the illumination lights on both targets dim when the night vision button is selected?
- Do the glare recovery lights illuminate when the appropriate button is activated on the Elliptech Hand Control Unit and when night vision is activated?

## Instructions for the subject

Good posture is essential for accurate test results; the strain of standing in an uncomfortable position will cause a subject to be distracted during the exam. The subject’s forehead should rest comfortably against the headrest throughout the examination, without pulling back or away from the instrument between individual tests, or tilting the head to the side. The subject can directly control adjustment of the height and angle of the Keystone DVS-V GT during the exam and may feel more comfortable grasping the side of the unit with one or both hands with elbows resting on the desk or counter.

If the subject normally wears glasses or contact lenses while driving, they should be worn during the examination. If corrective lenses are only worn for reading or distance vision, they should be removed for tests that do not deal with these vision areas.

## Screening Guide

Nine targets evaluate numerous visual functions important to driver safety. All tests are given at Far Point, the equivalent of 20 feet (6 meters). The test series can be completed in under 5 minutes.

The examiner administers all test operations through the push-button, remote Elliptech Hand Control Unit or the Keystone View Visionary Software. During testing, the subject stands or sits in front of the Keystone DVS-V GT screening instrument and positions his or her face against the viewing head to observe the test targets. Any glasses or corrective lenses normally used when driving should be worn.

After the examiner briefly explains the purpose of each test, the subject reports what s/he sees; and the examiner records these answers using special Keystone View DVS-V GT record forms or the Keystone View Visionary Software.

The DVS-V GT is designed to conduct driver vision screening in a highly standardized and sequential fashion to ensure consistent results. However, a subject’s visual skills rating also can be significantly impacted by the attitude of the examiner. The examiner’s goal should be to evoke from the subject the most accurate testing responses possible.

- Record basic subject identification information before beginning the actual series of vision tests
- Encourage the subject to be as descriptive as possible in telling what he or she sees
- During screening, keep conversation to a minimum to avoid unconsciously leading the subject into a certain kind of response
- Acknowledge each response, but be careful not to indicate approval or disapproval

Note that subjects with vision problems might exhibit slower test responses. Be sure to allow sufficient time.

# Keystone View DVS-V GT Tests

## Test 1: Quick Acuity

Nine separate blocks containing three 20/40 acuity letters each. The first column tests both eyes, the second tests right eye acuity, and the third tests left eye acuity. All three lines should be read, and only two digits in each column can be misread without failure. Note: **Both monocular and binocular vision** are tested in **one** presentation. The acuity level presented is 20/40, a standard used by most U.S. government and licensing agencies. Should a subject pass this test, it is not essential that s/he be given Tests 4,5, 6. Whether to conduct them or not is determined by the organization requesting or administering the test.

## Target 2: Color Vision

This is a test for gross, red/green color deficiency. If at least 3 of the 4 numbers presented are not identified by the subject, further examination by a vision professional should be recommended. The correct numbers are to be read back by the examinee.

## Horizontal and Vertical Peripheral Vision/Field Testing (*Do not advance the drum at this time*)

Miniature lamp (LED) targets between the lenses and recessed in the temple (side) areas of the viewing head show how far to the side a subject's visual field extends when s/he looks straight ahead. Persons with "tunnel vision", a grossly-restricted peripheral field, are quickly identified. The horizontal targets are selectively lit by individual buttons on the control panel to show a 45° nasal field and to check temporal fields at angles of 85°, 70°, and 55°. A total field of from 100° to 130° can be measured for each eye. The eyes may be tested separately or together. The vertical targets measure a total field of 70° with four settings. There are two nasal settings and angles of 35° above and 35° below.

This test is particularly significant in the case of vehicle operators. A person with normal lateral vision will be able to see a moving object with it is 90° (or at a right angle) to his/her eye on the outside.

No exact standards have been developed which show the point where reduction of lateral fields has affected accidents. Yet authorities state that a field more restricted than 60° would be a serious danger to another vehicle or a cyclist. Until there are international standards, Keystone strongly recommends a lateral reading for both eyes of 70° should be considered the minimum standard for safety as is required by the U.S. Interstate Commerce Commission. It is suggested that when a test subject who holds a motor vehicle operator's license demonstrates a severely restricted field, even though his/her other visual skills are normal, s/he be referred to a vision specialist for examination and professional opinion regarding driving.

## Target 3: Depth Perception and Sign Recognition

Subjects are asked to identify six road signs (at least five correctly to pass) *and* determine, both the closest and the farthest sign.

## Targets 4, 5, and 6: Acuity

To test acuity (fineness of visual discrimination), blocks of digits are presented for identification by the subject for the right eye (Test 4), the left eye (Test 5), then both eyes together (binocular – Test 6). Test 4 checks the acuity of the right eye while the left eye is open and seeing. It tests at Far Point and results are calibrated at values from 20/200 to 20/20 (6/60 to 6/6). Test 5 similarly tests the acuity of the left eye while the right eye is open and seeing. It tests at Far Point and the results are calibrated at values from 20/200 to 20/20 (6/60 to 6/6). Test 6 screens binocular vision at Far Point as well as night vision. It presents the same number groups to both eyes simultaneously and provides seven ratings ranging from 20/200 to 20/20 (6/60 to 6/6). All three acuity targets employ Sloan-type numerals without serifs.

## Target 7: Binocular Coordination (Phoria)

This simple test determines if the subject's eye muscles are properly balanced and coordinated. A passing response to the question, "Is the dot inside or outside the box?" will be, "Inside the box." It is completely normal for the subject to see the dot move around a bit; however, its movement should slow down to a limited range after a few moments.

## Target 8: Glare Recovery

Tests the driver's ability to adapt to decreased illumination and to recover rapidly from exposure to glare such as one would be exposed to driving at night. Subjects are presented a 3 rows of 7 numbers shown under decreased (night) illumination, glare and then a return to night illumination to gauge visual recovery from glare. If at least 6 of the 7 numbers in a row are not correctly identified, further examination by a vision professional is recommended.

**Currently, no standards have been set for the Glare Recovery test. Therefore, should an examinee be unable to pass this test as given, s/he should not be denied a license solely on the outcome of this screening.**

# Test Questions and Referral Guide

Note: All tests are given with both eyes open at all times. Subject should wear any glasses or contact lenses normally used for driving. Check the day/night switch to ensure you are testing the desired luminance.

## Test 1 Quick Acuity at 20/40 Level



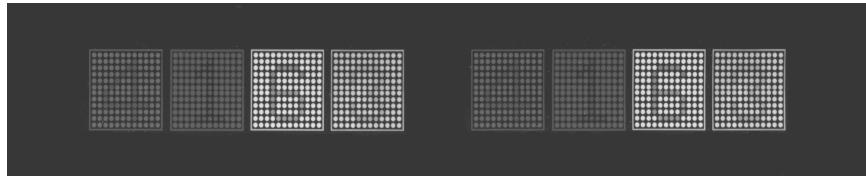
The examinee must read all numbers from the same row (1, 2 or 3). The first column tests both eyes, the second tests right eye acuity and the third column tests left eye acuity. If the examinee misses more than one digit in any one row, specify a new row to be read. If the examinee misses at least two digits in every row read, refer him/her to a vision specialist.

**Question:** “ Do you see three rows of numbers?” Look at the first block in row (1, 2 or 3) and read the digits starting from left to right.”

QUICK ACUITY TEST			
	BOTH	RIGHT	LEFT
Line 1.	958	479	823
Line2.	347	563	268
Line 3.	426	728	534

## Test 2: Color Deficiency

Actual Test



Answer Key

<b>COLOR</b>
4163

**Question:** “ Do you see four blocks with multi-colored dots? Can you distinguish numbers within the blocks? Please read them.”

**Recording:** Mark the number of numerals read correctly. Refer the examinee to a vision specialist if at least two numbers are misread.

## Horizontal Field Testing (Peripheral Vision Testing)

Instruct the examinee to focus on one of the colored squares straight ahead. Tell her/him that, at any time, a light may flash to the left or right side. The subject should respond “left side” or “right side.” The nose button tests 45° across the nose, in the nasal field. Testing the right eye nasal will yield a “left side” response.

### HORIZONTAL FIELD

85°	70°	55°	N	N	55°	70°	85°
-----	-----	-----	---	---	-----	-----	-----

For a one-eyed driver, a range of vision, should be tested. Do this by depressing both the “N” and “70 degree” buttons for the eye in question. A response of “both sides” or “two lights” is expected.

Examinees should be able to respond to at least the 55° and 70° temporal tests for each eye. If they cannot, visual problems may exist, and referrals should be made for a full professional eye examination.



## Vertical Field Testing (Peripheral Vision Testing)

Miniature lamp (LED) targets above and below the lenses of the viewing head show how far up and down an examinee's visual field extends when he/she looks straight ahead.



The vertical targets are selectively lit by individual buttons on the control panel or software screen to show an upper and lower left and upper and lower right fields.

**Question:** "Keep looking at the test panel and focus on one of the colored circles." Tell the examinee that at any time a light may flash up and right, left and down, left and up, or right and down.

### Tests 3: Depth Perception and Sign Recognition

Actual Test



Answer Key

**Sign/Depth**

1. Stop (Near)	4. Road Closed
2. Merge	5. Handicapped (Far)
3. No Left Turn	6. Signal Ahead

**Ask the subject:** "Please identify (name them) all six road signs."

"Do any appear closer to you than the others?" "Which?"

"Do any appear further away from you?" "Which?"

### Tests 4, 5 and 6: Acuity

Instruct the examinee to keep both eyes open at all times. Ask her/him to read the first block of characters, Line 1, Column A. If 5 of 6 are read correctly, s/he has 20/20 (6/6) acuity and need not read any further. If they are not, continue across each line, from left to right, until the test subject reads the characters in a block successfully. To pass the acuity test, at least five of the six characters must be read in Line 2, Column A of Tests 4, 5, and 6. S/he may report that no characters are seen; in which case, a visual suppression is evident, and the examinee should be referred for a full professional eye examination.

The standard for most government and licensing agencies is 20/40 (6/12) for each eye separately and both eyes together, as is done in Test 1. Specific businesses and industrial sites may have more strict requirements that must be considered. Compare the actual test presentation with the Keystone DVS-V GT Record Form. Notice that the answer key has added the symbols 20=, 25=, 30=, and so forth. This indicates the acuity level associated with the corresponding test characters: 20/20, 20/25, 20/30, etc. For example: In Line 1, Column B, "25=" indicates that the acuity level tested here is 20-25

#### Test 4 Right Eye

	A	B	C		A	B	C
1				1	547638	428576	943852
2				2	795823	537248	7236
3				3	9574	92	5

Answer Key

Right Eye: Acuity		
A	B	C
1. 20 = 547638	25 = 428576	30 = 943852
2. 40 = 795823	50 = 537248	60 = 7236
3. 70 = 9574	100 = 92	200 = 5

#### Test 5 Left Eye

Test Target

	A	B	C		A	B	C
1	745932	578236	346752	1			
2	534268	752386	6254	2			
3	8453	85	3	3			

Answer Key

Left Eye: Acuity		
A	B	C
1. 20 = 745932	25 = 578236	30 = 346752
2. 40 = 534268	50 = 752386	60 = 6254
3. 70 = 8453	100 = 85	200 = 3

#### Test 6 Binocular

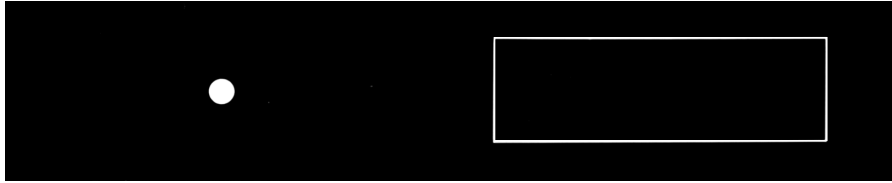
Test Target

	A	B	C		A	B	C
1	857432	674235	382457	1	857432	674235	382457
2	563472	859423	8927	2	563472	859423	8927
3	2978	43	9	3	2978	43	9

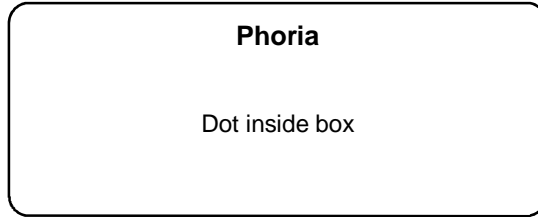
Answer Key

Both Eyes: Acuity		
A	B	C
1. 20 = 857432	25 = 674235	30 = 382457
2. 40 = 563472	50 = 859423	60 = 8927
3. 70 = 2978	100 = 43	200 = 9

**Test 7 Phoria:**



Answer Key



**Ask the examinee:** "Is the red dot inside or outside the yellow box?" If the dot is outside the box, a referral should be made for a full professional eye examination.

Note: Some examinees will see only the red dot or only the yellow box. This indicates a possible binocular vision problem. A referral to an eye specialist should be recommended.

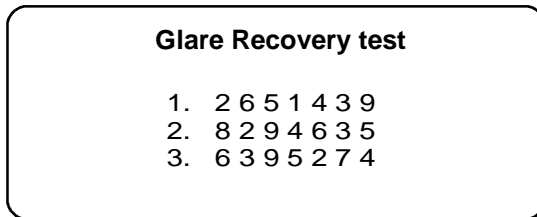
---

**Test 8: Glare Recovery**

Actual Test



Answer Key



Note: Make sure the day/night switch is set to the night position. Test will not operate in the day position. Instruct the examinee to keep both eyes open at all times, and that a light will flash in his/her field of view. When the light goes out, s/he is to read the line of numbers you request.

To perform this exam, press the glare button on the hand control panel. The glare lamps will illuminate for a period of 3 seconds. Once the glare lamps go out, the test subject is to read without delay one of the three lines you request. Reading six of the seven numbers in any one line in less than 5 seconds is considered passing. A watch or clock with a second hand would be convenient for the examiner.

**Please note: At this time no standards for Glare Recovery have been set. If the examinee does not pass this test, s/he should not be denied a license solely on the outcome of this test result.**

# Keystone View DVS-GT Maintenance

Under normal use conditions, the Keystone View DVS-GT instrument requires minimal attention if it is protected by the supplied dust cover when not in use. Virtually no repair or adjustment is needed since all operating components are protected and solid-state circuitry assures exceptionally high reliability.

## Cleaning

Periodically, some cleaning will be necessary.

*Be sure to disconnect the unit from its power supply before cleaning.*

The main instrument housing and control unit should be dusted from time to time with a soft cloth or brush. The lenses can be washed with a soft cloth and alcohol. Immediately dry the lens with a clean, dry, soft cloth or tissue. If the instrument has become very soiled, it may be cleaned with a mild soap-and-water or general purpose cleaner on a dampened cloth. Other solvents are not recommended.

When the Keystone DVS-V GT is used in a heavy industrial environment such as that of a foundry, it is possible that some dust may accumulate on the stereo targets. In this case, remove the top cover of the instrument and carefully dust the target with a make up brush. *The drum should not be removed.* Instead, rotate it using the test advance button on the control panel.

## Lamp Replacement

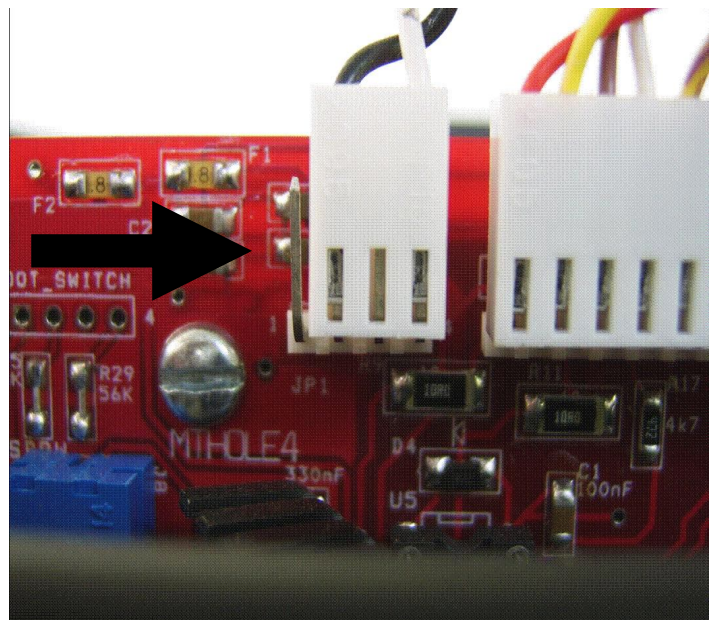
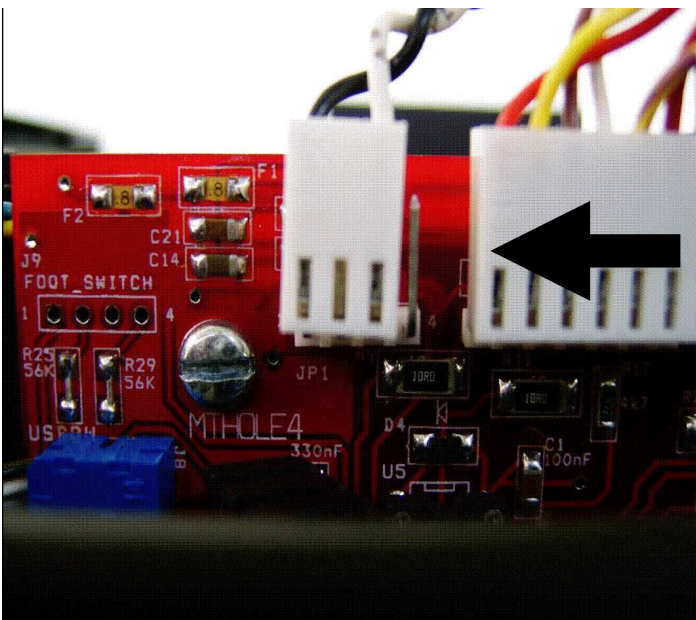
Two Nichia NSPW515BS Daylight LED lamps provide illumination of the stereo targets. Though the lamps are long-life rated, replacement may eventually be required. Contact your local distributor to order replacement LEDs. Carefully follow the instructions provided with the lamps as improperly installing them can cause immediate failure.

The peripheral vision test targets in the viewing head and the signal lights on the Elliptech Hand Control Panel are light-emitting diodes (LEDs). They are designed for extremely long life and should not require replacement during the lifetime of the Keystone DVS-GT Deluxe.

## Troubleshooting if the Instrument Will Not Turn On

In the unlikely event that a fuse has blown on the mother card, the vision screener will not activate after turning on the power switch. If this occurs a connector on the inside of the machine needs to be moved over one position to receive power from one of the backup fuses. Please follow the steps below

- Remove the top of the instrument.
- Attached to the on-off switch is a black and white cable, follow this to the other end where it is attached to a white connector with 3 terminals.
- Turn the instrument so the target drum is to your left and the eye shield is to your right. You will now be facing the red mother card.
- Remove the specified connector from the four pin receptacle where it is currently placed. There should be one unoccupied pin to the right of the connector.
- Move the connector one position to the right so it now occupies the pin furthest to the right, and the unoccupied pin is to the left.



### SNELLEN EQUIVALENTS

20/20 = 6/6

20/25 = 6/7.5

20/30 = 6/9

20/40 = 6/12

20/50 = 6/15

20/60 = 6/18

20/70 = 6/21

20/100 = 6/30

20/200 = 6/60

### NEAR VISION EQUIVALENTS

N.4 = 20/20 / J.1

N.5 = 20/25 / J.2

N.6 = 20/30 / J.4

N.8 = 20/40 / J.6

N.10 = 20/50 / J.8

N.12 = 20/60 / J.10

N.14 = 20/70 / J.12

N.18 = 20/100 / J.14



2200 Dickerson Road, Reno NV 89503  
Phone: (775) 324-2799 (866) 574-6360  
Fax: (775) 324-5375 (866) 574-6395  
E-mail: [sales@keystoneview.com](mailto:sales@keystoneview.com)