HSL-RT6-M45
Reynolds (APM) RT6 Light Tester
Leak Detection/Reject Control Package

The Systems Engineering HSL-RT6-M45 Leak Detection/Reject Control package is an electronic upgrade for the Reynolds RT-5 and RT-6 Light Testers which replaces the existing PMT with an advanced PMT and reject control package providing the following benefits:

◊ **Reduced Scrap:** Gated Photo-Multiplier Tube technology eliminates Tube saturation problems which in turn eliminates excess good can rejection following a gross leaker or when the machine is run empty. Accurate reject control rejects single leak cans at speeds up to 3000CPM.

◊ **Increased Reliability:** Gated Photo-Multiplier Tube (PMT) provides dramatic increase in PMT life (typical tube life is 1 to 2 years).

◊ **Improved Quality:** With increased sensitivity control, the HSL-RT6-M45 allows a greater insight into the can making process. Miss-alignment in bodymaker tooling, resulting in thin wall split flanges, can be determined by excess split flange rejects from that bodymaker. Necker/Flanger tooling problems can also be determined from cans rejected.

◊ **Quick Pay-off:** With the reduction in spoilage and potential increase in speed that can be realized, the HSL-RT6-M45 typically pays for itself in just a few months.

Features

- Replaces existing PMT with an advanced gated PMT and microprocessor based PMT calibration system to increase system sensitivity, adjustability, and insight into the light tester process. This allows a greater degree of diagnosis into can making problems (bodymaker and necker/flanger tooling problems, etc.)

- Performs high-speed control functions of RT-5 and RT-6 Light Testers to speeds in excess of 3,000 Cans Per Minute (machine mechanically permitting). This includes detection of leaker cans, rejection of leaker cans via the odd/even reject solenoids, alarm detection as well as data acquisition.

- Optionally excepts reject input from vision inspection systems to incorporate rejection of inspected cans by leaker reject solenoids.

- Provided with Halogen light source to replace both the existing fluorescent lamps and high frequency lamp driver for both increased test lumens and increased reliability.

- Upgrade package which interfaces with existing control system which includes: 24” X 24” X 10” control enclosure with PMT Interface and Reject Control Module, Advanced PMT assembly to replace existing PMT, Halogen Light Source Assembly, and Resolver (to replace existing encoder for timing).

- Performs the following control functions:

    - Detection of leakers (pin holes, split flanges, gross leakers, etc.). Does not reject good cans following a gross leaker or missing can.
    - Auto PMT offset feature which continuously calibrates PMT offset with the machine running in normal production to compensate for PMT drift with temperature, etc.
    - Static PMT gain calibration feature allows the operator to calibrate the gain of the PMT at the push of a button using a calibrated leak can with the machine not running.
    - Optionally interfaces with vision inspection systems to reject visually defective cans.
    - Controls Odd and Even reject solenoids to reject cans at speeds up to 3000CPM.
    - Alarm detection: bad pocket (excessive rejects from pocket), excessive good can rejection (light seals of machine compromised), timing signal failure, and PMT calibrate error.
    - Data Acquisition: Total number of good cans tested, total number of leaker rejects, total number of vision rejects, rejects per pocket, etc. (for both current and last shift).

General Description

The HSL-RT6-M45 Leak Detection/Reject Control package is an electronic upgrade for the Reynolds RT-5 and RT-6 Light Testers which replaces the existing PMT with an advanced gated PMT and microprocessor based PMT calibration system to increase system sensitivity, adjustability, and insight into the light tester process. This allows the detection and rejection of leaker cans at speeds up to 3000 Cans Per Minute (machine mechanically permitting).

The control package is not a dedicated “black box”, but instead is implemented using the high performance Systems M4530 PMT/PLC/PLS module which allows easy customization by either SEA or the end user. The module is programmed using the optional “SYSdev” (DOS based) software programming package which allows programming in any combination of Ladder Logic or high-level (subset of “C”), as well as perform on-line monitoring and trouble-shooting. The module incorporates a built-in PLS which interfaces directly with the machine-mounted resolver and provides all machine timing, eliminating the need for an external PLS.

Leak detection/Rejection

The package interfaces directly with the machine mounted photo-multiplier tube (PMT), machine mounted resolver, and the existing odd and even reject solenoids. Defective cans (leakers) are detected via the PMT and rejected by activating the odd or even reject solenoid as appropriate at speeds up to 3000CPM. The system is extremely sensitive and easily capable of detecting a pin-hole of .002” or less diameter in a can.

Advanced PMT and Interface Electronics

The HSL-RT6-M45 incorporates "gated" PMT technology. The PMT is gated "on" both when the tube is aligned with a pocket and in-between the pockets. The gate pulse which occurs in-between pockets, at the dark portion of the shutter, is used as a base "dark" measurement for offset calibration. Note that the tube is only gated "on" at the pockets and in-between the pockets for less than one millisecond and not just continuously enabled. This prevents the tube from saturating when a gross leaker or missing can is present at the pocket, allowing the following cans to be fully tested. In addition, this feature dramatically increases the life of the PMT.

The interface electronics to the PMT is microprocessor based, allowing the implementation of powerful gain and offset calibration algorithms as well as insight into the light testing process. The relative sensitivity of the system is set via the PMT gain and a user adjustable "threshold" parameter. The following PMT process data is available for viewing to determine how well the system is set-up and operating: average PMT value for each sampled can, hi and low deviations from "good" can value, actual detected light level for the last eight leakers. Through these parameters, the system can be set-up very accurately to the level of sensitivity required.

Automatic PMT Calibration

Three parameters, set in the M4530 module, are used to calibrate the PMT: Gain, Reject Threshold, and Offset. The PMT "Gain" and "Reject Threshold" are used to set the sensitivity of the system. These parameters are set such that the desired minimum leak can will be rejected. The automatic gain adjustment feature allows the "gain" to be set automatically by placing a calibrated leak can (with the minimum desired pin-hole to be detected) in the machine, while it is stopped, in front of the PMT in the worst case orientation and pressing a button. The gain will then be set to the lowest possible level that will allow this can to be rejected.

The automatic offset adjustment allows the M4530 to compensate for PMT drift due to temperature. The M4530 adjusts the offset automatically such that, while the machine is running in normal production, the returned light level for good cans equals a "desired good can" value (set-point) set in the M4530. This provides the proper balance between the PMT value of the good cans and bad cans such that the good cans are not rejected while the bad (leak) cans are rejected in all circumstances.

Halogen Light Source

The package is provided with a halogen light source that replaces the existing fluorescent lamps and high frequency lamp driver. This provides light in the spectrum the PMT is optimized for but provides a number of additional benefits as well including: Increased test lumens which allows a greater degree of system sensitivity; elimination of the high frequency lamp driver and the failures associated with the driver (the halogen lamps are powered directly from 115VAC, 50/60HZ for the ultimate in lamp source simplification and reliability); reduction of light emitted in the UV spectrum (as compared to the use of black light fluorescent) for increased personnel safety.

Alarm Detection

The following alarms are detected by the package: *Bad Pocket* (excessive rejects from a specific pocket), *Excessive Good Can Rejection* (light seal of PMT compromised), *Timing Signal Failure* (resolver or coupler failure), and *PMT Gain Calibration Error* (no light detected while calibrating with leak can or too much light detected while calibrating with leak can). The above alarms are mapped to discrete outputs on the M4530 which can be interfaced with the existing control system.

Data Collection

The following data is collected for both the current shift and the previous (last) shift: Total number of good cans tested, total number of leak cans rejected, total number of vision rejects, and the total rejects per pocket. This data can either be viewed locally on the display of the HSL-RT6-M45, viewed through the "HSL-RT6" set-up program, or can be sent to the host PLC via RS-232 communications (MODBUS or Allen-Bradley DF1 protocols) using the optional S4516 communications board. The information is updated ("current" shift transferred to "last" shift) based on the change of state of a discrete input.

In addition to the shift data collection, a separate buffer is available to collect rejects per pocket counts as a diagnostics aid to the operator for trouble-shooting a light seal problem on a specific pocket. Unlike the shift data, these counts can be reset manually by the operator at will. This allows the operator to note an abnormally high count on a specific pocket, attempt to correct the problem, reset the counts and then check the counts at a later time to determine if the problem is corrected.

HSL-RT6-M45 Keypad / Display

The keypad of the HSL-RT6-M45 contains 24 keys consisting of data display commands, setup commands, and a numeric keypad. The display is a 2 line by 40 character back-lit LCD display which displays the selected data and setup menus. The keypad/display can be used by the operator to view the current and last shift data as well as the rejects per pocket diagnostic data. In addition, the keypad/display is used by authorized personnel (passcode or key switch protected) to adjust the timing and all PMT setup parameters.

Vision Inspection System Reject

The package can optionally except a reject signal from a vision inspection system and reject these cans with the same odd and even leaker reject solenoids. The vision system reject signal must occur between the infeed load location on the tester and the reject pocket. The vision reject signal must also be synchronized with the machine. The data collection differentiates between leaker rejects and vision rejects such that the relative sources of spoilage can be determined.

Ordering Information

The HSL-RT6-M45 package includes a 24" X 24" X 10" NEMA 12 enclosure to be mounted on the tester, advanced PMT assembly, Halogen light source, and resolver for timing. The order number is as follows:

Part Number	***Description***
HSL-RT6-M45	Reynolds (APM) RT-5 and RT-6 Leak Detection/Reject package including the following:
	1ea. HSL-RT6-M45 Enclosure (24" X 24" X 10") with M4530 PMT/PLC/PLS Module (with required I/O boards).
	1ea. Photo-Multiplier Tube (PMT) and Housing.
	1ea. PMT Cable Set.
	1ea. RSV34-MS1 Resolver
	1ea. RSV-RSCBLE-100 Resolver Cable
	1ea. Halogen Light Source Assembly
	1ea. HSL-RT6-M45 User's Manual
	1ea. HSL-RT6-M45 Program Disk
	1ea. M4500 User's Manual

HSL-RT6-M45 Options *(purchased separately)*

Part Number	***Description***
S4516	RS-232 Communications Board (MODBUS and DF1 protocols)
S4573	16-point 10-30VDC Output to drive individual pocket reject indicators.

SYSTEMS Electronics Group, Inc.
Division of ***SYSTEMS Engineering Associates, Inc.***
14989 W. 69th Ave., Arvada, CO 80007
Telephone: (303) 421-0484 FAX: (303) 421-8108 www.sea-seg.com