Combine Operation: Loss Monitors

Randy Taylor
Extension Assistant, Agricultural Engineering

Willard Downs
Extension Agricultural Engineer

Marvin Stone
Associate Professor, Agricultural Engineering

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Loss monitors are becoming increasingly popular as part of the instrumentation package on new combines. In addition, loss monitors can be retrofitted to virtually any combine. They can provide valuable information about the operation and adjustment of the machine. However, in order for the information from a loss monitor to be of any value, the operator must understand how his particular monitor works, what its limitations are, and how it can be correctly calibrated.

There are generally two types of loss monitors: relative and area-based. Relative monitors provide a nonarea-based indication of losses at a specific operating speed and set of operating conditions. This type of monitor provides a reading based only on the number of kernels hitting the pads; therefore the reading is valid at one speed only. The operator normally selects a comfortable ground speed and adjusts his combine to what he considers is an acceptable loss. The loss monitor is then calibrated to this set of operating conditions. If ground speed or other conditions change, the operator must recheck combine losses and recalibrate the loss monitor.

An area-based monitor combines the readings from the relative monitor and a ground speed indicator to form an actual loss reading. The operator again selects comfortable operating conditions and calibrates the loss monitor to these conditions. However, when small changes in ground speed are made, the area-based monitor continues to provides an accurate indication of losses. If wheel slippage is high, the indicated loss will appear higher than it actually is.

Both types of monitors have the same basic components consisting of sensor pads, control panel, and meter (Figure 1). The sensor pads are mounted on the back of the cleaning shoe and straw walkers. Material striking the pads creates an electrical pulse which is transmitted to the control panel and processed for display on the meter. The control panel consists of coarse and fine adjustment controls and a selector switch to determine which pads the monitor is reading. The control panel allows the operator to control the sensitivity of the pads.

Calibrating a Loss Monitor

When using a loss monitor, remember that the monitor reading is no better than its calibration. It is also important to note that loss monitors measure only threshing and separating losses. Header and preharvest losses are not measured by the loss monitor. An operator should take time to determine the threshing and separating losses and adjust the loss

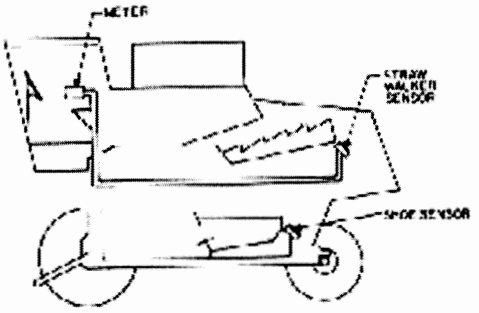

Figure 1. Typical loss monitor system.

monitor to reflect these losses in its reading. Most monitors provide readings for both walker and shoe areas, as well as a combined reading. The operator should watch the combined reading, but also be aware of the other two separate readings. When losses become excessive on the combined reading, the operator can check the individual readings to determine the source of the loss.

Before calibrating a loss monitor, the operator should insure that his combine is properly adjusted, and operating satisfactorily. Most loss monitors have coarse and fine adjustment controls. The coarse adjustment usually determines a size and weight range of kernels that will cause the sensor pad to send a signal to the monitor. The fine adjustment determines how many kernels in a period of time are required to cause a particular magnitude of monitor reading.

With the combine operating properly, first set the fine adjustment control at the maximum level and the coarse adjustment at the minimum level. If the operator's manual provides information for coarse adjustment based on seed type, then set this control based on that information. Run the combine for about 30 seconds. If the monitor is not in the red zone adjust the coarse control to the next higher level. Repeat this process until the monitor is operating in the red zone, then reduce the fine adjustment control setting until the monitor is operating at the mid-range level. Recheck the threshing and separating losses. If they are satisfactory, the monitor is calibrated. If the fine control does not have the range to bring the monitor reading to the correct level, then the coarse control will have to be adjusted.

When calibrating a monitor take more than one loss sample to validate the initial set point. Continue to check losses until the monitor consistently displays a reading reflecting the amount of loss. The accuracy of the monitor reading should be checked several times during the day, or whenever field conditions change.

Using a Loss Monitor

Remember, a loss monitor reading is only as good as its calibration. If an operator is not willing to take time to properly set his monitor, the readings will be useless. Even when a monitor is properly calibrated, there are times when the reading does not represent actual losses. Small changes in ground speed or a slug of material passing through the combine have short term effects on the monitor reading. Changes in crop conditions or fan setting may have long term effects. For sensitive monitor settings, small increases in the number of kernels hitting the pads can show significant changes in monitor readings. It is impossible to keep the monitor reading in the satisfactory range continuously, so let the reading stabilize before you make any adjustments in combine operation.

The monitor is constantly measuring and comparing pulses from the sensor pads and ground speed indicator. Because it usually takes about 15 seconds for material to pass though the combine, changes in ground speed may cause false monitor readings for a short time. The monitor reading may jump into the red zone, informing you that loss is high, but 15 to 20 seconds should be allowed for the monitor to stabilize before any more adjustments are made. Monitor fluctuations often accompany a slug of material passing through the combine. The monitor reading will jump into the red zone, but as soon as the slug has passed,-it should drop back into the green zone. If it doesn't move back after about 30 seconds then ground speed should be reduced or losses rechecked.

Changing crop conditions affect the loss monitor reading. When straw moisture is high, the monitor may mistake a piece of straw for a kernel of grain. Be aware of changing crop conditions and the need to change the monitor setting if necessary.

Sensor pads are usually mounted directly to the back of the cleaning shoe; therefore, the kernels that they sense must fall within about 7 inches of the shoe. Kernels falling beyond 7 inches will not be sensed. Changes in fan settings can suspend kernels in the airstream long enough to carry them over the sensor pads (Figure 2). When large fan adjustments are made on-the-go, the monitor may indicate that losses have decreased when they actually may have increased.

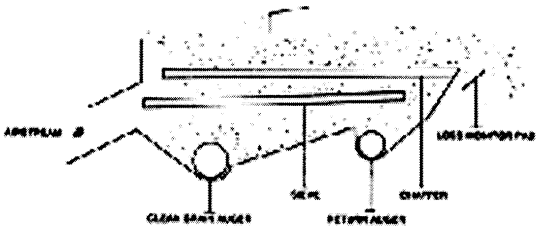

Figure 2. In normal conditionsl grain sloughing off the chaffer will strike loss monitor padsl but in overblown conditions, air can carry grain beyond the pads.

A properly calibrated loss monitor can act as a warning device for plugged straw walkers or chaffer. When either of the two are plugged, grain will slough off onto the sensor pads and the monitor will move into the red zone. Reducing ground speed will not bring the reading back into the green zone which indicates a problem exists.

Harvesting on a side slope can cause problems for your monitor. Cleaning shoe losses increase dramatically on side slopes with the majority of the losses occuring on the low side. When this happens, the sensor pads are no longer in the optimum locations and the loss measured is not representative of the actual loss.

Summary

In general, loss monitors can help control grain loss but only when they are calibrated and used properly. The combine operator should know what type of monitor he has and be aware of its limitations.

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