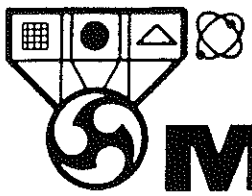

MIX-MIZER

CONTROLS DIVISION OF COLUMBIA MACHINE, INC.

LOAD SENSOR

INSTRUCTION MANUAL

107 GRAND BOULEVARD, VANCOUVER, WA. 98661

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INTRODUCTION

The Mix-Mizer "Load Sensor" Automatic Batching Control System, commonly referred to as "LS," is designed to accurately control the complete batching and mixing operation in a concrete products plant. This system is unique in that it requires no costly, space consuming aggregate batcher. Aggregates are batched, from overhead gates or conveyor belts, directly into the mixer. This method of aggregate batching is based on the principle that any aggregate added to the mixer will offer a definite opposition to the rotation of the mixer blades. This opposition is transmitted to the mixer motor, via the drive train, resulting in an increased motor load that is proportional to the material in the mixer. A unique transducer and sensor continuously monitor the motor load to develop a usable output voltage. In the proper sequence, this output voltage is compared to different pre-set reference voltages, which correspond to definite quantities of the various aggregates. The flow of each aggregate is precisely controlled; therefore, consistent proportioning is always assured.

After the aggregate is batched, pre-wet water is added, if desired. Optional admixes are later dispensed. Cement, automatically weighed on a small conventional beam scale, is dumped into the mixer, and is allowed to disperse throughout the aggregate before final water is added. Accurate moisture control is accomplished by electronically comparing the resistance of the mix to that of adjustable reference resistances. If desired, another admix may be added before the final mixing time begins. The mix remains in the mixer until the machine hopper has emptied sufficiently to require another batch. Before the mixer is discharged, trim water is added, if needed. If a skip hoist or conveyor belt is incorporated for transfering the mix to the machine hopper, it will also be automatically controlled. The cycle is repeated again and again without human attendance, after a few initial adjustments have been made.

The LS is the simplest and most economical of any batching system approaching its accuracy. Besides eliminating the need for an aggregate batcher, this system overcomes the fallacy of other batching methods by practically eliminating batch size variation due to the varying moisture content of bulk aggregates. Since water has both bulk and weight, the induced error in other types of batching systems will be proportional to the percentages of water present in the aggregates. Although, the motor load does increase somewhat when water is slowly added to a "bone dry" aggregate, its load versus moisture curve quickly levels to form a plateau which remains relatively flat until saturation occurs. The individual minimum moisture content of most bulk aggregates usually lies within this plateau, although this plateau may occur at different percentages of moisture for each aggregate. Thus, it can be seen that the load sensing method of batching self-compensates for the varying moisture content of the aggregates.

The resultant increased production efficiency and the elimination of a "mixer man" will soon repay the initial investment of the system. With a reasonable quality of installation workmanship and routine plant maintenance, this system will provide many years of dependable service.

OPERATION INSTRUCTIONS FOR LOAD SENSOR (LS) AUTOMATIC BATCHING CONTROL SYSTEM

The following operation instructions are for a standard Mix-Mizer LS batching system, as installed in a single machine block plant using a stationary cement weigh batcher, with a beam scale, and batching one to three bulk aggregates directly into the mixer.

PRELIMINARY START UP PROCEDURE

Before attempting to start the automatic batching system, the operator should perform the operations outlined in the following steps.

1. Ascertain that the cement batch hopper is empty and that the scale is balanced and working freely. Set the ingredient poises to the desired cement weight. Unlock the trig latch.

2. Ascertain that the compressed air supply is operating and that it is delivering 80-90 PSI to the pneumatic system. The automatic oiler should contain sufficient oil for a day's run. The filter bowl should also be drained.

3. Close the by-pass and open the master cut-off water valves at the mixer.

4. Free the mixer of hard lumps or any other objects that may damage the probe.

5. Inspect and clean the mixer probe.

6. Inspect and clean the machine hopper probe.

7. Inspect the mechanical and electrical components of the system: such as; vibrators, interlock switches, aggregate flow switches, valves, cylinders, gates, additive dispensers, etc. Downtime can be minimized by correcting the small faults when they first appear.

8. Start the mixer motor.

9. Engage the mixer clutch.

10. Turn on the safety switches of motors and other equipment that is controlled by the system.

11. Adjust the additive dispenser(s) such that the desired amount of additive(s) will be dispensed.

SETTING THE CONTROLS

1. Place the "power control" knob in the "stand-by" position. This control is associated with the mix control and all of its components.

2. Place the "fused power switch" in the "on" position. All power to the automatic system is supplied through this switch. (Power is supplied to the aggregate batching section via the interlock relay on the LSP module. The mixer motor must be running before this relay is energized.)

3. Place the "cement automatic-last batch" switch in the "automatic" position. The cement should immediately begin weighing, as indicated by the lamps on the graphic panel.

4. Place the "automatic-alarm off" switch in the "automatic" position. This will allow the alarm horn to sound if certain malfunction conditions exist.

5. Place the progress indicator in position #16. This is the normal starting and stopping position.

6. When starting up initially, it is necessary to adjust the "sensitivity" potentiometer on the LSP module such that the "load monitor" meter indicates "10" ("empty mixer"), when the mixer is running with no load. Note: If the meter deflects down scale as the sensitivity control shaft is rotated clockwise, interchange the lead connections of the clamp-on current sensor (amp probe). Allow the mixer to run unloaded for at least 5 minutes before making this adjustment. Care should be exercised when making this adjustment, since high voltage is present on the LSP module! Tighten the locking nut on the sensitivity control when the adjustment has been properly made. Since, this sensitivity adjustment influences the setting of each ingredient module knob, new knob settings will be necessary if this sensitivity control is adjusted otherwise after the proper ingredient values have been established. The load monitor should always maintain this indication when the mixer is empty and its motor is running. Divide 10 into the load monitor indication in order to determine the actual LSP module output voltage (mixer load).

7. Place the "run-set" switch on the LS module in the "set" position, when initially starting up or when establishing a new formula. If the formula has already been established

by previous batches, place the switch in the "run" position.

Initially, adjust the "over tolerance" control, on the LS module, fully counterclockwise. This should result in an "over" indication on the module. Slowly rotate this control clockwise, until the "balance" lamp glows. Adjust this control slightly more clockwise, if the "over" lamp flashes frequently when the aggregate is being batched, or if the "balance" lamp does not glow when the mixer is completely discharged on future batches. An "over" condition will prevent the progress indicator from advancing off of any aggregate batching position or position #14.

If single speed conveyor belts are solely used for feeding aggregates, the "fast feed" control can be ignored. Otherwise, adjust the fast feed control to the approximate center of its range of rotation. Closely observe future automatic batches. There should be at least 8 or 10 rhythmic pulses of each bin gate during the final phase of batching each aggregate. If there is too much fast feed, there will be a resultant tendency to over-batch the aggregate. There will also be batch size variation.

Since the slow feed bite size of each aggregate greatly influences the setting of the "fast feed" control, it is necessary to properly adjust the actuator position of each flow control switch. When using aggregate conveyor belts, it is sometimes necessary to decrease the material flow onto the belt to prevent over-batching or batch size variation; since, conveyor belts have only one speed.

8. When starting up initially, or when establishing new formulas, it is necessary to determine the proper knob setting for each ingredient module. Place each "run--by-pass" switch in the "by-pass" position for the respectively undesired aggregate. For each desired aggregate, place its respective "run--by-pass" switch in the "run" position; also rotate its respective ingredient knob fully clockwise. When running an established formula, adjust the ingredient modules in accordance with the recorded values for that formula.

   The plug of each ingredient module pigtail must be installed into its respective connecting cable socket. In turn, the plug on each connecting cable must be plugged into either socket #18, #1, or #2, in order for the ingredient modules to be energized. Usually these cables are installed such that ingredient modules #1, #2, and #3 are energized in sequence. This sequence should not be

changed unless the quantity of the first material to be batched will be very small. In which case, it is recommended to change the order of the connecting cables, such that the small quantity will be batched last.

If fewer than three ingredient modules are supplied, a "zero" plug will be installed in each position socket (#2 or #1) normally occupied by a connecting cable plug. Also, there will be a special jumper plug installed in each "ingredient module" socket that is not occupied by a like module.

9. If initially starting up or establishing a new formula, place the "water" switch in the "off" position and rotate both the "pre-wet" and "final water" control knobs fully clockwise. If pre-wet water is not desired, rotate the "pre-wet" control knob fully counterclockwise. When an established formula is being run, the "water" switch should remain in the "auto" position; the "pre-wet" and "final water" control knobs should be adjusted to the corresponding settings for that formula. The "on" position of the "water" switch allows the operator to manually add water.

10. Reset the cement "batch counter" by rotating the thumb knob.

EXPLANATION OF THE OPERATING SEQUENCE

After the previously outlined operations and adjustments have been performed, the control system may be placed in operation by rotating the "power control" knob to the "run" position. (The empty mixer should have been running and the stand-by power should have been applied to the system for at least 5 minutes before beginning operation. This will allow all components to stabilize). If the control settings are not known for a particular formula, it will be necessary to complete certain set-up procedures before totally automatic operation can begin. After the necessary control settings have been made, the progress indicator will automatically advance as each operation is completed. The operation at each position of the progress indicator is identified by a large "tattle" dial. Each operation is programmed by the mix stepping switch to which the progress indicator is attached. When the proper condition exists at each position, the respective delay relay for that position, will be allowed to time out. A resultant stepping signal will be sent to the pulser module. This module will then generate a step pulse which will advance the position of the stepping switch. The progress indicator will by-pass each position having a "zero" plug in its

respective delay relay socket.

The operator may stop the progress indicator in order to check most of the various operations as they are performed, by placing the "power control" knob in the "hold" position. Functions associated with position #17, #18, #1, #2, and #5 (if skip is used), are notable exceptions. When re-positioning the progress indicator, always place the "power control" knob in the "standby" position before doing such.

As an aid in understanding the various functions of the control system, the following 18 steps briefly describe the basic operations at each position. Since, the function of the indicator lamps on the graphic panel is apparent, their operation is not further explained.

1. Position #16, "check cement batch" is the normal stopping and starting position of the progress indicator. The progress indicator will remain in this position for the duration of the delay relay in socket #16, after the cement scale indicator reaches balance. Thus, verifying that a cement batch has been weighed.

2. Position #17, "probe spray," allows the solenoid water valve to open for a short interval, if a probe spray control module is installed in socket #17. This burst of water assists in cleaning the mixer probe. The progress indicator will pause at this position for the duration of the delay relay installed in the socket of the probe spray module. The "water" switch will have no control of this function. (Never place the "water" switch in the "on" position when the progress indicator is in position #17, since the progress indicator will go into "orbit.") If the "probe spray" function is not desired, completely remove the module and replace it with a "zero" plug.

3. Position #18,-- "batch aggregate no. 1." The ingredient module whose connecting cable is plugged into socket #1, will be energized ("in use" lamp will glow), unless this module is by-passed. The LS module compares the mixer load voltage to that of the adjustable reference voltage of the ingredient module. If the sum of these two voltages (error) is negative, as will be the case if the ingredient knob is set to a higher value than the average load monitor indication, the "under" lamp and possibly the "feed" (fast feed) lamp will glow. (The amount of negative error voltage required to cause the "feed" lamp to glow is dependent upon the "fast feed" control setting.) If the "run-set" switch is in the "run" position, the ingredient module will allow its respective aggregate to be fed when the "under" lamp glows. The aggregate bin

gate will fully open, if the "feed" lamp is glowing, to admit the major quantity of the selected aggregate into the mixer. The load monitor indication will increase and the gate will begin pulsing when the "feed" lamp ceases to glow. If a small quantity of material is demanded, it will be fed entirely by slow feed. (When aggregate is fed by a conveyor belt, the material will flow at one continuous rate). The slow, or dribble, feed will continue until the average load monitor indication approximates that of the ingredient dial. At which time the "under" condition and the aggregate feed will cease. The "balance" lamp will glow indicating that the pre-set amount of aggregate has been batched. At this time, the average error voltage will be near zero. As a result of the slight fluctuation of the mixer load, due to the action of the mixer blades, the "under" lamp may flash occasionally, resulting in the addition of a small amount of aggregate each time. This must not be confused with actual slow feed. Occasionally, the "over" lamp may flash. However, the "balance" lamp should glow a large percentage of the time. When "balance" is maintained for the duration of the delay relay (5 seconds) within the ingredient module, the progress indicator will be advanced.

If a somewhat larger than pre-set quantity of aggregate is batched, the error voltage will be so positive that the "over" lamp will glow continuously. When this condition exists, the progress indicator will not advance. (The "over" tolerance control setting determines how positive this error must be before an "over" condition exists). An "over" condition is usually the result of having too much aggregate in mid-air as the target quantity is approached. In most cases, the initial setting of the "fast feed" control will provide more than adequate slow feed if the flow control switch has been adjusted properly. Thus, it will be necessary to adjust the switch actuator such that it is deflected less when the gate is closed; therefore, a smaller bite size will result. There should be at least 8 or 10 rhythmic pulses of the bin gate during slow feed, if the bin gate is directly above the mixer. More slow feed and a smaller bite size will be required as the distance between the bin gate and mixer increases. Due to many factors, the bite sizes of the various materials will be different. Usually, the "fast feed" control can be adjusted somewhat more clockwise than the initial setting, when all flow control switches are properly adjusted. However, this setting should not be changed until at least one complete automatic batch of aggregate has been observed. If conditions necessitate, the "fast feed" control setting may be decreased.

If determining the ingredient knob setting, the "run-set" switch will have already been placed in the set position; the ingredient knob will have also been rotated fully clockwise, unless the ingredient module has been by-passed. The "under" lamp and possibly the "feed" lamp will be glowing now. When the "run-set" switch is in the "set" position, only the four indicator lamps on the LS module will function; no work will be performed. The desired amount of the associated aggregate must be manually added. The load monitor indication will increase in proportion to the amount of aggregate added. After the desired quantity of aggregate is added, slowly rotate the ingredient knob counterclockwise while viewing the indicator lamps. Stop rotating the knob the instant that the "balance" lamp glows. If the "under" and "balance" lamps flash alternately, adjust the knob slightly more counterclockwise until the "balance" lamp glows continuously. The ingredient dial indication will be approximately the same as the average load monitor indication. However, do not become alarmed if the indications do not exactly correspond. A quantity of aggregate with a mixer load equivalent to that of the sample, will automatically be batched later. Minor ingredient knob adjustments may be required on successive batches. Rotate the knob clockwise for more aggregate; counterclockwise, for less aggregate. Adjustment of successive ingredient knobs may also be required; since, the batched quantity of a succeeding aggregate is also dependent upon that of previous ones. The progress indicator must be manually advanced when the set-up procedure has been completed for the particular ingredient module.

If the ingredient module associated with this position has been by-passed, the progress indicator will not stop at this position.

4. Position #1 is labelled "batch aggregate #2." The operation of this position is similar to that explained for position #18, except that a different ingredient module is selected. The "load monitor" indication and the setting of the associated ingredient knob, of course, will be higher.

5. Position #2, labelled "batch aggregate #3", functions as the two previously explained positions, except that a different ingredient module is likewise selected. If the "over" lamp glows persistently, although the aggregate appears to have batched properly, rotate the "over tolerance" control slightly more clockwise. This is sometimes necessitated by the "swing" of the mixer load, especially in large batches. (It is typical for the "over" lamp to glow after the progress indicator advances from position #2.)

If the "run-set" switch is not in the "run" position, place it there after all of the ingredient modules have been set or by-passed. This will allow the aggregate to be batched automatically in future batches. The progress indicator will advance automatically from this position if "balance" is maintained.

6. Position #3 -- "pre-wet." When in this position the moisture module compares the resistance of the mixer probe to that of the "pre-wet" control. If the "water" switch is in the "on" position, the "water on" lamp will glow and the solenoid water valve will add water to the mix when the moisture meter indicates a "dry" condition. As water is added, the resistance of the mix decreases and the meter needle moves toward "0". When the meter needle is approximately at "0", the water valve will close and the "wet enough" lamp will glow. There may be a few additional short bursts of water before a maintained "wet enough" condition exists. The meter needle should remain in the vicinity of "0". The delay relay in socket #3 will time out when the "wet enough" condition exists.

   If pre-wet water is not desired, the "pre-wet" control will have been rotated fully counterclockwise. The progress indicator will remain in this position for the duration of the delay relay in socket #3.

   If establishing the setting of the "pre-wet" control, the "water" switch will have already been placed in the "off" position; the pre-wet control will have been rotated fully clockwise. The moisture module will be indicating a "dry" condition. Water must be added manually, either by opening the manual by-pass valve, or by placing the "water" switch in the "on" position until the desired moisture level is attained. This operation can best be performed with the aid of an experienced observer stationed at the mixer. When the correct moisture level is attained, the "pre-wet" control knob must be slowly rotated counterclockwise while observing the "wet-enough" lamp. Stop rotating the knob the instant that the "wet-enough" lamp glows. If the lamp flashes excessively, rotate the knob slightly more counterclockwise until flashing barely ceases. (Although, the meter on the moisture module approaches "0" as the correct "pre-wet" control setting is neared, it is not advisable to adjust the control solely by viewing the meter. The previously described method is more accurate.) This adjustment should assure the proper pre-wet moisture level of succeeding batches. However, it may be necessary to readjust it slightly if the moisture level of the succeeding

batches is not exactly as desired. Rotate this control slightly clockwise if more water is desired, counterclockwise, if less water is desired. When a "wet enough" condition exists, the delay relay in socket #3 will begin to time out.

7. Position #4 -- "dispense additives." The progress indicator remains in this position for the duration of the delay relay in socket #4. While in this position, an auxiliary or external relay contact closure is provided to start the additive dispenser timer. The progress indicator will advance and the dispenser will complete its cycle independently. If this function is not needed for the particular installation, a "zero" plug will be installed in socket #4.

8. Position #5, "spare", is generally unused. Thus, a "zero" plug is installed in socket #5.

9. Position #6 -- "dump cement." The cement batcher gate will open. Also, a cement batch will be registered on the batch counter. The beam lifter will raise the ingredient beam on the scale and an "over" condition will exist. When the batcher empties, the indicator will return to "balance." When the "balance" condition exists, the delay relay in socket #6 will begin to time out, if the batcher gate switch is released.

   When the progress indicator advances, the cement gate will close, the ingredient beam will be released, and the independent cement batching cycle will begin anew.

10. Position #7 is usually unused and is thereby labeled "spare." Unless this position is used for some special purpose, a "zero" plug will be installed in socket #7.

11. Position #8, "disperse cement," is strictly a timed operation to permit thorough dispersing of the cement throughout the aggregate before final water is added. The progress indicator remains in this position for the duration of the delay relay in socket #8.

12. Position #9 -- "final water." This position functions for final water just as position #3 does for pre-wet water. The duration of the delay relay in socket #3 determines how long the progress indicator remains in this position after a "wet enough" condition is attained.

    When establishing the proper "final water" control setting, follow the same procedure previously described for pre-wet.

After the "final water" control has been adjusted, place the "water" switch in the "auto." position. This permits water to be automatically added on successive batches. The "final water" control setting is usually more critical than that of "pre-wet."

13. Position #10, "dispense calcium chloride," has the same relationship to calcium additives that position #4 has to dry or liquid detergent-type additives. The progress indicator pauses at this position for the duration of the delay relay in socket #10. If this function is unused, there will be a "zero" plug installed in socket #10.

14. Position #11, "final mix," is strictly a timed operation which allows more complete mixing of the batch. The progress indicator will remain here until the batch has mixed for the proper length of time as determined by the delay relay in socket #11.

15. Position #12 -- "mix ready/trim water." If a trim water attachment is incorporated, additional water will be added to the mix when the hopper module indicates "empty," if dry-down has occurred during mixing time. When the proper moisture level has been restored, the delay relay in unit #2 of the trim water attachment (plugged into socket #12) will time out.

    This position also provides a signal for the "over mix control" if desired. This signal will allow the over mix control to disengage the air clutch or stop the mixer motor, if the hopper module is indicating not empty when the delay relay in the "clutch" socket has timed out. This prevents serious over-mixing. However, this function is rarely used. In which case a "zero" plug will be installed in the "clutch" socket so that the "mix ready" lamp will glow.

16. Position #13 may be labeled either "check skip" or "spare," depending upon the use of a skip hoist. If a skip hoist is used, the progress indicator will remain at this position until the delay relay in socket #13 times out as a result of the actuation of the lower skip switch. Thus, to prevent dumping of the mixer into the skip pit, the progress indicator will be detained until the skip has safely moved into position under the mixer gate. If no skip is used, a "zero" plug will be installed in socket #13.

17. Position #14 -- "discharge mixer/check load." The mixer gate will open. When the mixer is emptied, the "over" condition will cease and the "balance" lamp will glow. When this "balance" condition exists, the delay relay in socket #14 will time out, if the mixer gate switch is released. (When the mixer is completely emptied, the load monitor indication should return to "10.")

18. Position #15 may be labeled either "check mixer gate/ start skip up" or "check mixer gate," depending upon the use of a skip hoist. If a skip is used, an up signal will be supplied to the "up" slave relay when the mixer gate closes sufficiently to actuate the gate switch. When the lower skip switch is released, as a result of the skip moving upward, the delay relay in socket #15 will be allowed to time out. If no skip is used, the delay relay will begin timing out when the mixer gate switch is actuated.

    The skip, if used, will be on an independent cycle when the progress indicator advances off of position #15. When the skip actuates the upper skip switch, the delay relay in "auxiliary 1" socket (of the LS batch panel) will be allowed to time out and thus energize the "down" slave relay. (The "skip" switches supplied by Mix-Mizer do not control the stopping of the skip.)

This completes one batching and mixing cycle which will be repeated again and again.

The "empty" lamp on the hopper module should cease glowing when the material completely covers the tip of the hopper probe. If not, it will be necessary to adjust the "sensitivity" control on the hopper module. (This control is factory adjusted and rarely needs adjustment in the field.) Loosen the lock nut and rotate the control clockwise approximately 10° past the point where the "empty" lamp glow ceases. Tighten the lock nut. Check to see that the "empty" lamp glows when the tip of the hopper probe is uncovered as the machine hopper is emptied.

When a satisfactory mix is produced, record the control settings so that the same formula may be easily duplicated later.

SHUT DOWN PROCEDURE

For short shut downs, it will probably be desirable to stop with the mixer empty, and with a complete batch of cement weighed. To accomplish this, merely set the power control switch to the "hold" position, after the mix step switch has arrived at position #16. To begin production, set the power control switch to the "run" position.

At the end of a day's run, it will be desirable to stop with all hoppers and the mixer empty. To accomplish this, place the "cement automatic-last batch" switch in the "last batch" position when cement balance is indicated on the graphic panel. No cement can be weighed, thus, the progress indicator will stop on position # "16" after the existing batch of cement has been discharged. Place the "power control" in the "stand-by" position and the "fused power switch" in the "off" position after the progress indica-

tor has stopped at position "#16". Before leaving the plant unattended, it is advisable to place all motor, safety switches in the "off" position; close both the air and water supply valves. If freezing conditions are likely to exist, drain the solenoid water valve.

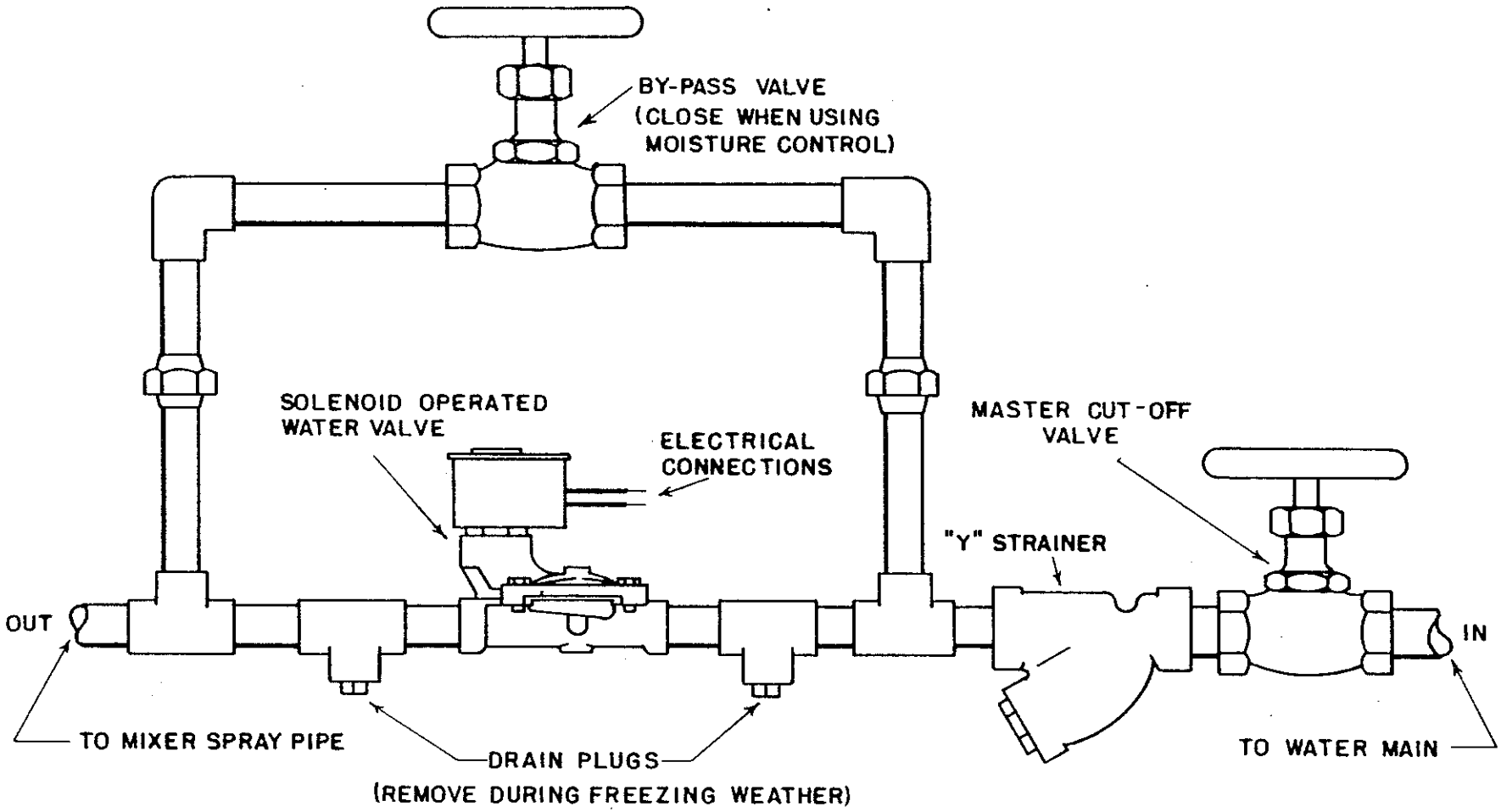
HOPPER PROBE INSTALLATION AND GENERAL INFORMATION

Locate the hopper probe in one side of the machine hopper, approximately 15 inches above the material level when the mixer is to be discharged. It is advisable to locate the probe only as high as necessary to assure that the hopper will not be emptied between successive batches during maximum machine consumption. A small allowance must be made for the delay between hopper demand and mixer discharge. Select a hopper area where material flows freely, without the formation of cavities.

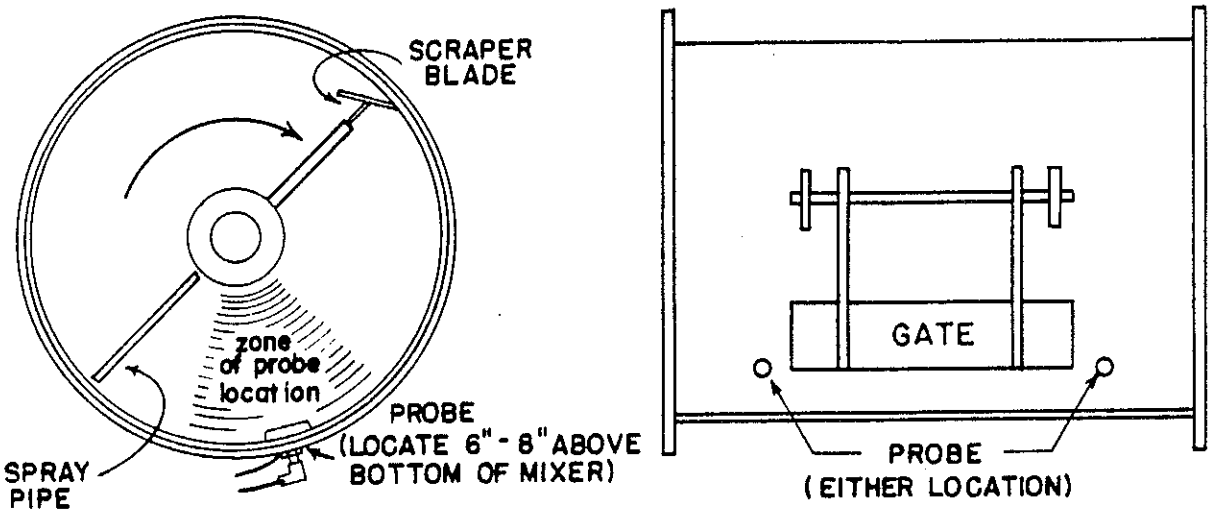
Cut a rectangular hole, approximately 2 inches wide and 5 inches high. Position and weld the holder onto the outside of the hopper such that the beveled cylindrical portion is projecting downward into the rectangular hole. Loosen the 1/2 inch set screw and insert the 36 inch probe, plain end first, into the holder. Adjust the probe such that the tip will be slightly above the top of the material when the mixer is to be discharged. Gently tighten the set screw. It may be necessary to adjust the probe height when production has begun. Withdrawing or raising the probe results in earlier discharge of the mixer. Do not withdraw the probe to the extent that hardened material will bridge the insulator between the tip of the probe and the inside of the hopper or holder. Extending the probe further into the hopper will delay the discharge.

One electrical connection must be made to the terminal post of the probe; another to the ground screw on the probe holder. Crimp-on type wire terminals are supplied for these two connections. Use two-conductor, rubber insulated cable for connecting between the probe and holder to a nearby junction box. Allow sufficient excess cable for possible probe adjustment later. Refer to the plant wiring diagram for the proper connecting point of the wires at the control panel.

It is necessary to clean and inspect the probe periodically for optimum results. Cleaning can best be accomplished by using a wire brush.

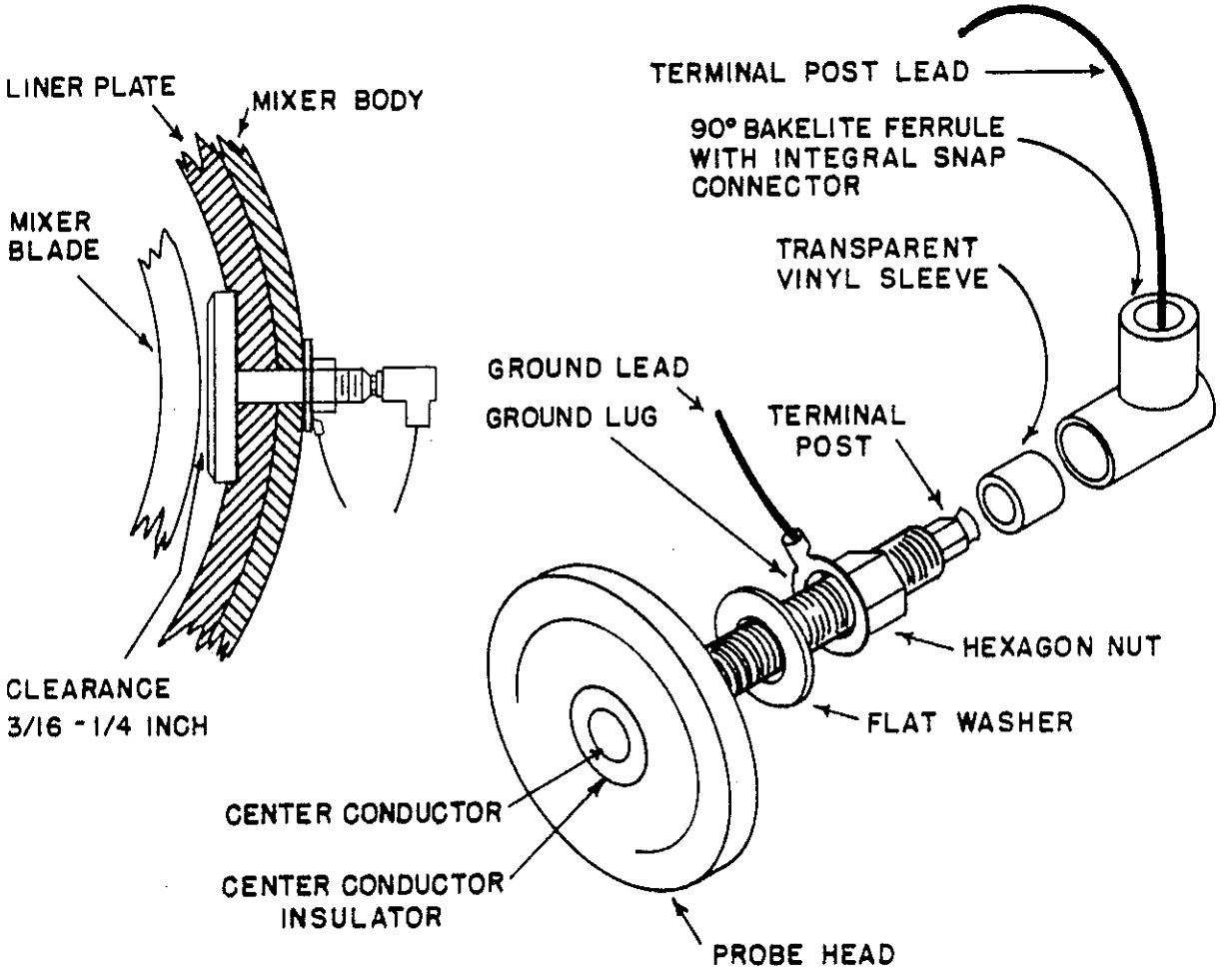


SUGGESTED WATER VALVE INSTALLATION



STATIONARY TUB MIXER (TOP VIEW)

RIBBON BLADE MIXER (FRONT VIEW)



1A694 MIXER PROBE INSTALLATION

INSTALLATION INSTRUCTIONS AND GENERAL INFORMATION FOR 1A694 MIXER PROBE

The 1A694 mixer probe must be located in the wall of the mixer such that its sensing surface is exposed to the active mix, constantly monitoring the resistance of the mix. The small changes in probe resistance are sensed by the moisture control.

Ribbon Blade Mixer -- Locate the mixer probe near either side of the mixer gate at a level slightly below the bottom line of the discharge opening, in an area where concrete build-up is at a minimum.

Stationary Tub Mixer -- Locate the probe at a level of 6 to 8 inches above the bottom liner plates in an area approximately 30 to 90° in advance of the spray pipe, relative to the direction of blade rotation.

Refer to the "1A694 mixer probe installation" drawing.

It is mandatory that the probe face be at least flush with, or raised above, the inner liner surface. Some mixer manufacturers provide a probe mounting hole. If there is no probe provision, a liner bolt may be removed to insert the probe, since the probe is sufficiently strong to retain the liner plate. A less preferred method is that of using an electric arc welder for cautiously burning a hole of 17/32 inch minimum diameter through the liner plate and mixer body. It is necessary to pre-heat the liner plate prior to burning the hole to prevent cracking. Remove all rough edges and hardened material surrounding the mounting hole. Since the liner plate surface forms a slight arc, and the rear of the probe is flat, it is desirable to provide a flat seating surface for the probe to prevent breakage. This can be accomplished by grinding the liner plate surface flat in the region which will be covered by the probe.

Remove all hardware from the probe. Insert the probe stud into the mounting hole and temporarily secure it with the flat washer and hexagon nut. Tighten the nut only "finger tight." Check the clearance between the mixer blade, or scraper, and the center of the probe. For optimum results this clearance must be maintained at 3/16 to 1/4 inch. If necessary, equally adjust the mixer blades until the desired clearance is attained. Secure the blades to prevent possible slippage. If the liner plates and blades are badly worn, it may be impractical to obtain the desired clearance by merely adjusting the mixer blades. In which case, it will be necessary to install spacers beneath the probe. However, the probe should not project too far into the mixer, since it will be subject to breakage or excessive wear. When installing the probe in a new mixer, it may be desirable to slightly grind the blade, or scraper, in the area that will pass over the probe in order to

attain the proper clearance.

There are two electrical connections to be made to the probe; one to the probe body (ground), and the other to the terminal post at the end of the mounting stud. Consult the wiring diagram for the proper control terminations of these two connections. The terminal post is internally connected to the small conductor centered in the probe head. Remove the transparent vinyl sleeve from the 90° bakelite ferrule and loosen the spring snap terminal, with the aid of a small screw driver. Remove 3/8 inch of wire insulation from the lead to be connected to terminal post. Straighten the exposed strands and insert the wire into the small hole in the bakelite ferrule. Tighten the snap terminal until the wire is securely held. Insert the vinyl sleeve into the large end of the ferrule until there is 3/8 inch protruding. Remove 1/4 inch of wire insulation from the ground lead and securely crimp the barrell of the large ground lug onto the exposed wire strands.

Remove the hexagon nut from the rear of the probe and install the ground lug onto the probe stud while holding the flat washer against the mixer body. Replace the hexagon nut onto the stud and tighten it to no more than five foot pounds. Overtightening of the nut will result in probe breakage. Install the snap connector onto the terminal post. The vinyl sleeve should form a tight seal between the bakelite ferrule and the terminal post insulator. Re-check the clearance between the probe and mixer blade, or scraper.

Clean the probe daily or at the end of each work shift. This can best be done with a putty knife and wire brush. Do not use a hammer!

ADJUSTMENT OF SCALE INDICATOR SWITCHES

To simplify adjustment remove all actuator wires from saddle (Fig. 1) except the one from switch to be adjusted. This way any click heard is from switch being adjusted.

FAST SWITCH: Adjust so switch clicks just before pointer reaches bottom limit of travel.

SLOW SWITCH: Adjust so switch unclicks about 3/16" below balance point when pointer is rising.

OVER SWITCH: Adjust so switch clicks about 1/4" above balance when pointer is falling.

"Click" indicates point where switch is operated as pointer falls.
"Unclick" indicates point where switch returns to normal as pointer rises.

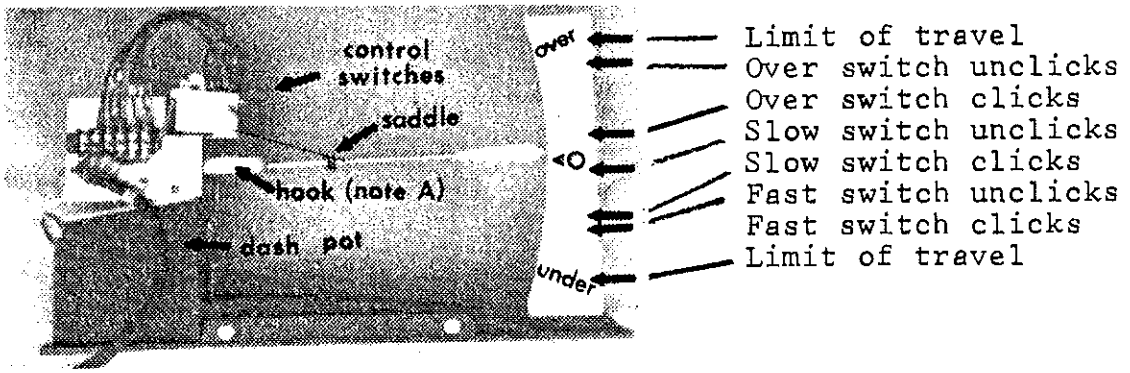
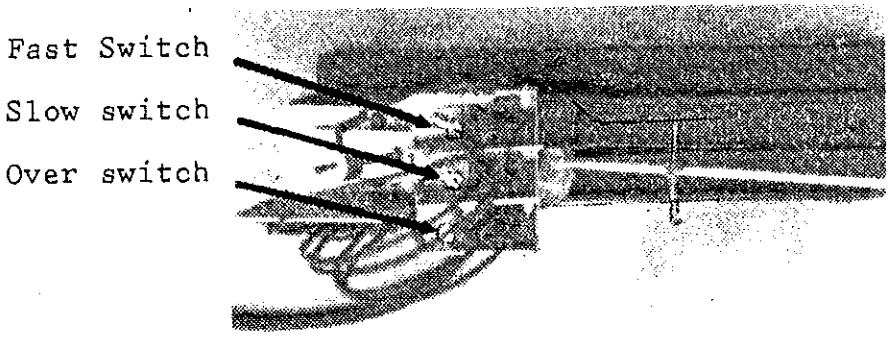


Fig. 1 - Controlling indicator for beam scales.

NOTE A: Adjust hook left or right so that pointer travels almost full scale but does not hit limit stops.



In some cases, the fast and over switches may be reversed from positions shown in Fig. 2. To identify them, the over switch makes 3 connections at terminal block and the fast switch makes only 2.

If all materials overweigh, adjust slow switch down slightly. (Turn adjusting screw clockwise.)

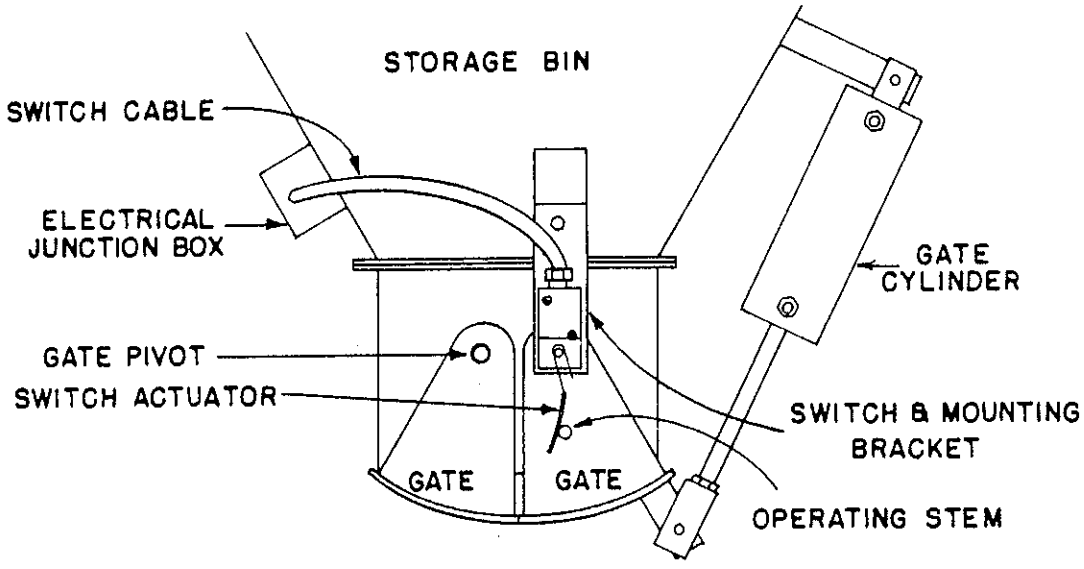
If one or more materials weigh right and one or more weigh short or over, adjust flow of material.

If the plant wiring diagram does not indicate a connection to the white lead of the indicator cable, the fast switch is unused.

ADJUSTMENT OF AGGREGATE FLOW CONTROL SWITCHES

An aggregate flow control switch is provided for each bin gate. The switch is necessitated in order to reduce the amount of material in mid-air during the batching of the final few hundred pounds of each aggregate. Each switch should be positioned such that its shaft axis is aligned with that of one of its respective bin gate pivots. The switch actuator should be adjusted such that its spring rod is deflected sideways by the operating stem (attached to the gate at a radius of 4 1/2 inches from the switch shaft) when the gate is closed and is released when the gate is partially opened. The degree of actuator deflection determines the slow feed bite size. Usually, the switch actuator is initially adjusted such that it will be released when the gate is 1/4 open. The final adjustment of each flow control switch must be individually determined. Adjust each switch actuator as needed, such that it is deflected more or less for a respectively larger or smaller bite size.

When slow feed begins, the gate will partially open and close in rapid succession due to the making and breaking of its flow control switch contacts. Since all flow control switches are wired in series, any switch which is not operated when its gate is closed will cause all slow feed to be inoperative.



TYPICAL INSTALLATION OF A FLOW CONTROL SWITCH

MOISTURE CONTROL INFORMATION

Presently, the operation of all moisture controls (including the Mix-Mizer line) for conventional, non-slump concrete mixes, is dependent upon the electrical conductivity of the mix or its constituents. This conductivity is determined by measuring the electrical current flow through a probe, or probes, located in either the mixer or aggregate batch hopper. The Mix-Mizer line incorporates a single probe located in the mixer. (For those plants which produce slump mixes, Mix-Mizer, Inc. manufactures moisture controls which operate on a different principle.)

If all other factors remain equal, the conductivity will be directly proportional to the amount of water that is on the surface of the particles. The key to the success or failure of the moisture control lies in the previous statement. Some of the other factors that are sometimes not equal, are as follows: aggregate gradation (coarseness of the material); conductive chemicals, impurities, or additives present; temperature; aggregate porosity (cavities in the particles); material pressure against probe; surface condition of the probe; and others. The effect of some of these factors and what can be done for their compensation will be discussed later.

Fortunately, the water that is trapped within the pores of the particles has very little effect on the conductivity of the material, since the electrical current flows mostly on the surface. This is good, because the consistency (viscosity) of the concrete is determined by the surface moisture of the particles. However, this does not imply that entrapped water is not a problem. Actually, it is desirable to have all internal pores filled with water before the cement is added to the mix. This prevents the cement from being lost in the pores, as well as furnishing badly needed water for cement hydration during the curing cycle. For this reason, Mix-Mizer moisture controls have a pre-wet function for adding water to porous (lightweight) aggregates. During the pre-wet portion of the mixing cycle, water is added until the conductivity rises to a pre-determined level. This indicates that the particles are saturated, causing water to remain on the surface.

If pre-wet water is added too rapidly, the water will not soak in fast enough. Thus, water will remain on the surface before the saturation point is reached. Some competitive moisture controls add a large quantity of water to the surface of the particles, assuming that it will be absorbed later, leaving the surfaces of the particles in good condition. This can be disastrous, since some materials may be saturated due to heavy rainfall on the stock pile; the surplus water added fails to be absorbed. Even more water may be released when some of the particles are broken down by the crushing action of the mixer blades. Of course, this results in a batch that is too wet.

Mix-Mizer combats this condition by stopping the water flow when the surface moisture is just right. If dry down occurs, more water will be added in order to restore the surface moisture to the proper level. This process is repeated until the proper conductivity level is maintained for a reasonable length of time.

After cement is added and allowed to disperse throughout the aggregate, final water is added in a manner similar to that of pre-wet water. The pre-wet and final water levels are individually adjustable by their respective control knobs.

AGGREGATE GRADATION

When aggregate gradation changes from very coarse to very fine, or vice versa, a corresponding change in the current flow through the mix will result. This is due to the change in the total surface area of the particles contacting the probe. When the aggregate is coarse, the particles may contact the probe in only a few places, whereas, fine particles may contact the probe in many places. Thus, a given current will flow through a fine mix having less water than that of a coarser mix. With automatic moisture controls, a slightly dry mix will result if the batch is finer than the sample to which the control was adjusted. Conversely, a coarser batch will be wetter than desired.

Most aggregate suppliers control the gradation closely enough to prevent this effect from being a problem, if reasonable steps are taken to prevent segregation in the stock pile, handling equipment, and storage bins. Listed below are some steps that have been successfully applied in order to minimize the variation in gradation.

1. "Water down" the material being delivered to the stock pile or storage bins to prevent the roll down of large particles.
2. Proportionally use material from the different areas or levels of the stock pile.
3. Keep the storage bins as full as possible.
4. Batch the materials from as many storage bins as is possible.
5. Batch as many gradations as possible, blending them accurately in the batching operation.

CONDUCTIVE IMPURITIES AND CHEMICALS

Chemical impurities are one reason for adding final or trim water late in the mix cycle, just before discharging the batch. By this time, the mix is relatively stable chemically, due to neutraliza-

tion of acids by the water and cement.

In the case of cinders, iron "clinkers" may be present in varying amounts. These clinkers should be removed magnetically before being allowed to enter the mixer.

TEMPERATURE

Variation in aggregate temperature may cause some variation in the moisture level of the mix. If hot materials are used, a given current will flow through the mix with less water than that of a mix composed of cold materials. Thus, a hot batch will be slightly drier than desired. Also, the evaporation rate is faster with hot materials. Consequently, further "dry down" occurs in the interval between mixing and the actual placing of the concrete in the products.

To truly compensate for this condition, the moisture control unit must consider the temperature of the materials, ambient temperature, relative humidity, and time interval between mixing and placing. As can be seen, this would require a rather complex calculator. Since, the time interval is an unpredictable variable, and only one out of a hundred users has a real temperature problem, it remains Mix-Mizer's opinion that temperature compensators are impractical.

MIX PRESSURE AGAINST PROBE

The action of the mixer blades results in a varying material compression level for any given area in the mixer. The resulting changes in material pressure against the probe cause the conductivity of the mix to fluctuate. Mix-Mizer overcomes this problem of fluctuation by averaging the conductivity. Years of past experience have revealed that one probe is more effective than two.

Some manufacturers install their probes in the wear plates of the mixer such that the surface of the probe is flush with the surface of the wear plate. However, years of Mix-Mizer research have revealed that better results are available if the surface of the probe is allowed to protrude somewhat. This assures that the surface of the probe will remain exposed to the active material, and will thus be supplied with a fresh sample each time the mixer blade passes.

SURFACE CONDITION OF THE PROBE

If the probe is allowed to become encrusted with hardened concrete, it will become partially insulated from the mix. This may cause moisture variation due to the periodical break away of parts of the crust. A good preventative against crust build up, is a short

burst of water (probe spray) into the empty mixer prior to charging it with aggregate. This will aid in the cleaning of the probe for each batch. Of course, the probe must be located in accordance with its installation instructions.

TROUBLE-SHOOTING INSTRUCTIONS

Mix-Mizer has made every effort to simplify trouble-shooting of the control system. All electronic circuits are contained in plug-in units referred to as modules. These modules never need to be serviced in the field. The plant maintenance man merely plugs in a spare and returns the defective unit to the factory for repair. Other components which are subject to failure, can also be easily replaced. With a reasonable inventory of spare parts, the plant maintenance man can become almost as proficient a trouble-shooter as a factory trained technician.

The "tattle dial" is a tremendous aid in trouble-shooting. When a malfunction occurs, the trouble-shooter merely notes the position of the progress indicator and the function for that position. Then, logically associated components, both internal and external, are located. For most functions, only a few components are associated. Therefore, only a few minutes are required for trouble-shooting, even if the trial and error method of replacing and/or adjusting is used. Close observance of the graphic panel indicator lamps may reveal some helpful diagnostic clues.

Many malfunctions are attributed to operator error. Carelessness and insufficient knowledge of the operation of the system are frequent contributors. The operator should thoroughly understand the system before attempting its operation. Neglected periodical inspection and maintenance of the external components of the system contribute greatly to malfunctions and break-downs.

It is understood that the stepping switch, pulser module, 50 conductor cable, power control harness, and delay relays with corresponding position numbers can cause trouble in any or all positions. Although the white control chassis is capable of causing a malfunction due to a defective socket, broken wire, or shorted wires, such is rarely the case. Defective external components and plant wiring are frequently sources of trouble.

If a cartridge fuse in the control is repeatedly blown, replace the 10 amp. plug fuse with a 300 watt, 120 volt incandescent lamp, and then replace the blown fuse. The main power switch should be used for switching the control "on" and "off". The lamp will glow brightly when the fuse-blowing condition exists. This speeds servicing, conserves fuses, and prevents further unneccessary damage. Remove suspected components and external wires until the lamp ceases to glow. Refer frequently to the plant wiring diagram. Once the source has been localized, isolate and correct the defect. If the lamp glows although all modules are removed and all terminal wires are disconnected, excepting L1, L2, and GND, remove the control chassis and inspect for evidence of a short circuit as indicated by smoked or charred insulation. After the problem has been corrected, remove the lamp and replace the 10 amp. plug fuse.

All items returned to Mix-Mizer, Inc. for repair, must be accompanied by a complete explanation of the malfunction, including the conditions present when the malfunction occurred.

The following list contains some of the malfunction symptoms and possible causes which cannot be readily diagnosed by observing the "tattle dial." If the mal-adjusted or defective component cannot be determined, a phone call to Mix-Mizer may be required. If such is the case, it is necessary to know the exact conditions of the failure; such as, exactly where the process stopped or the failure occurred, positions of all control and stepping switches, what indicator lamps are glowing, and unusual symptoms noted before the failure. It is highly advisable to make brief notes since it is difficult for one to remember all of the details.

SYMPTOMS	POSSIBLE CAUSES
1. Progress indicator skips positions, stops between positions, or makes short jerking motions without completing a step.	1. Defective stepping switch. 2. Defective pulser module.
2. Stepping switch struggles during an attempted step.	1. Pulse intensity potentiometer in pulser module is mal-adjusted. (Consult factory for adjustment instructions.) 2. Defective pulser module. 3. Defective stepping switch.
3. Progress indicator goes into "orbit."	1. Defective pulser module. 2. "Water" switch "on" while at "probe spray" position.
4. Moisture varies from batch to batch.	1. Mixer probe improperly located. 2. Mixer probe and/or blade excessively worn. (Recommended blade to probe clearance is 3/16 - 1/4 inch.) 3. Loose mixer blade. 4. Loose probe wire or connector.

SYMPTOMS	POSSIBLE CAUSES
4. (Con'td.) Moisture varies from batch to batch.	5. Small center conductor broken within probe.
	6. Cracked ceramic insulator in center of probe.
	7. Leaking by-pass or solenoid water valve.
	8. Solenoid water valve in need of cleaning or repair.
	9. Water flow rate too high. (Adjust cut off valve to allow as much wetting time as can be spared when the materials are dryest.)
	10. Variation of material gradation.
	11. Varying amounts of conductive chemicals, or "clinkers," in aggregate.
	12. Improperly used conductive addmixes. (These should be added after final water.)
	13. Different cements mixed in storage bin.
	14. Hot materials causing mix to dry out fast in machine hopper.
	15. Mixer gate leaking.
	16. Variation of cement or aggregate batch size.
	17. Large variation in mixing time due to machine stoppages.
	18. Large fluctuations of water pressure.
	19. Defective moisture module.

SYMPTOMS	POSSIBLE CAUSES
5. Mixer discharges "soupy" batch with water still flowing.	1. Solenoid water valve not closing.
6. Mixer discharges dry batch.	1. Shorted mixer probe.
	2. Shorted probe wiring.
	3. Defective moisture module.
7. Progress indicator remains at positions #3, #9, or #12 and water fails to stop flowing.	1. Small center conductor broken within probe.
	2. Broken probe wire or loose connector.
	3. Defective moisture module.
8. Batch size variation.	1. "Fast feed" control adjusted too far clockwise.
	2. Defective or improperly adjusted aggregate flow control switch(es).
	3. Bin gate(s) not closing properly.
	4. Variation in material gradation.
	5. Slipping mixer clutch or drive belts.
	6. Defective bearing or gear in mixer drive train.
	7. Current sensor improperly installed.
	8. Defective LSP module.
	9. Defective LS module.
	10. Defective ingredient module.
9. The LS module indicates "under," but no slow feed occurs.	1. One or more defective aggregate flow control switches.
	2. Defective flow control switch wiring.
10. Aggregate batching section inoperative, although mixer is running.	1. LSP module fuse blown.

MIX-MIZER, INC.

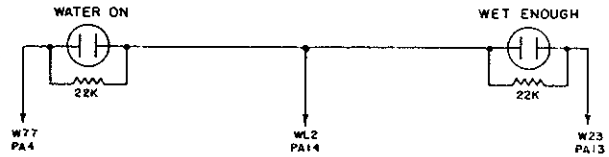
W A R R A N T Y

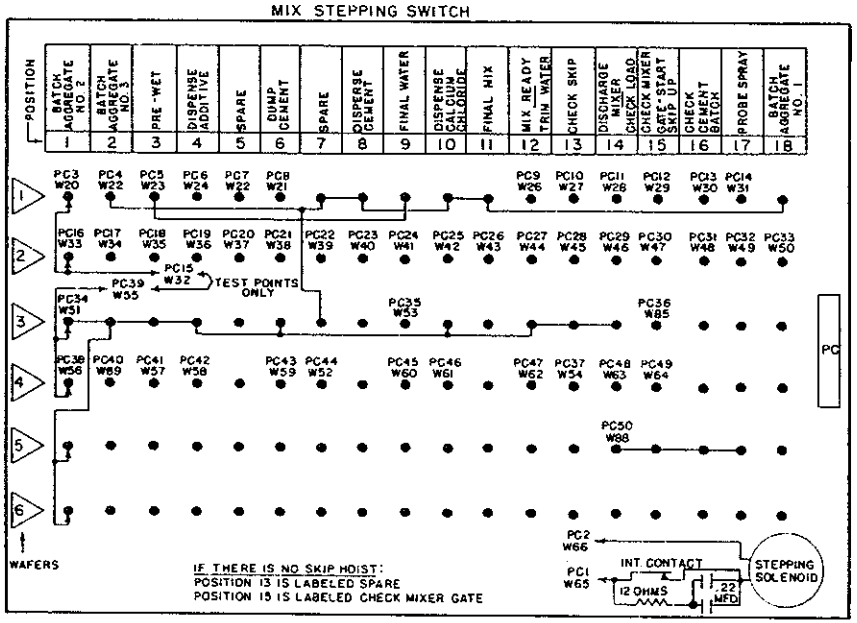
Mix-Mizer, Inc. (herein referred to as "Mix-Mizer") warrants that each new Mix-Mizer product is free from defects in material and workmanship under normal use and service for a period of ninety (90) days from the date of sale (by an authorized Mix-Mizer dealer to the first purchaser). If any such defect occurs during the warranty period, the aforesaid purchaser should immediately communicate with Mix-Mizer, Inc. Mix-Mizer will furnish or arrange for repairs or replacement of the defective part within the terms of this warranty. The defective part should be returned promptly to Mix-Mizer's factory, transportation prepaid. If upon examination by Mix-Mizer, the part is determined to be defective, Mix-Mizer will, subject to the conditions and limitations below mentioned, either repair the defective part or replace it with a new part.

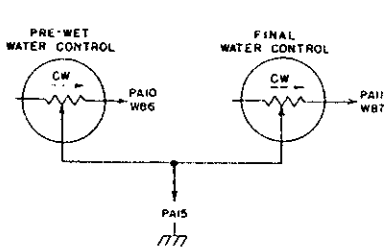
Mix-Mizer shall not be obligated to furnish any labor required or be responsible for Labor charges incurred in installing or servicing a Mix-Mizer product including the removal therefrom of any defective part or the installation of a replacement part, nor shall Mix-Mizer be liable for any delay or failure to furnish a replacement part resulting from any governmental restriction, priority, or other allocation or any other governmental regulatory order or action, or otherwise.

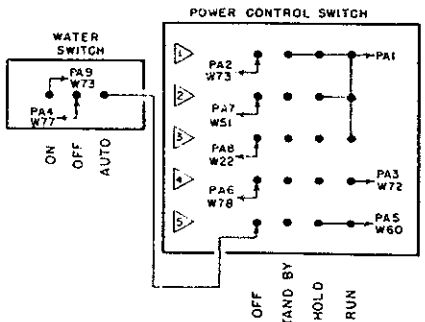
This warranty shall not apply to any Mix-Mizer product which has been repaired or altered in any way, so as, in Mix-Mizer's judgment, to effect its stability or reliability, nor which has been subject to misuse, negligence, or accident, nor which has had the serial number altered, effaced, or removed. Neither shall this warranty apply to any Mix-Mizer product which has been connected otherwise than in accordance with the instructions furnished by Mix-Mizer.

This warranty is expressly in lieu of all other warranties expressed or implied, and of all other obligations or liabilities on Mix-Mizer's part, and Mix-Mizer neither assumes, nor authorizes any representative or other person to assume for it, any liability in connection with the sale of Mix-Mizer products.

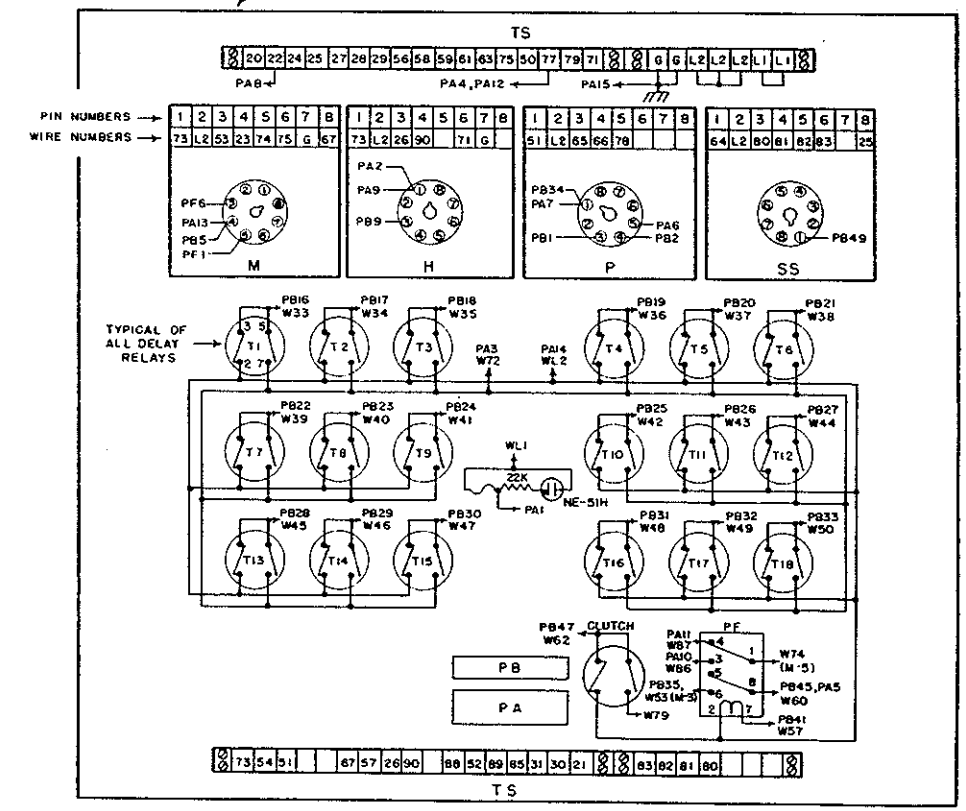








MIX CONTROL CHASSIS



LEGEND

TS = TERMINAL STRIP
M = MOISTURE MODULE (DWG. NO. 3A849)
H = HOPPER MODULE (DWG. NO. 1A781)
P = PULSER MODULE (DWG. NO. 1A900)
SS = SPECIAL PURPOSE SOCKET
PA = 18 CONDUCTOR SOCKET AND PLUG FOR CONTROL CABLE
PB = 50 CONDUCTOR SOCKET FOR STEPPING SWITCH CABLE
PC = 50 CONDUCTOR SOCKET ON STEPPING SWITCH
PF = PRE-WET AND FINAL WATER SELECTOR RELAY, KRPIIAG (USUALLY REPLACED BY A TRIM WATER ATTACHMENT DWG. NO. 1A633)
W = WIRE NUMBERS (SEVERAL DO NOT APPEAR AT TERMINAL STRIP)
T1 THRU T18 AND CLUTCH ARE THERMAL DELAY RELAYS (115NO__).

NOTES

PB AND PC ARE CONNECTED VIA 50 CONDUCTOR CABLE.

PROBE SPRAY MODULE (NOT SHOWN) INSTALLED IN SOCKET T17 (DWG. NO. 1A632).

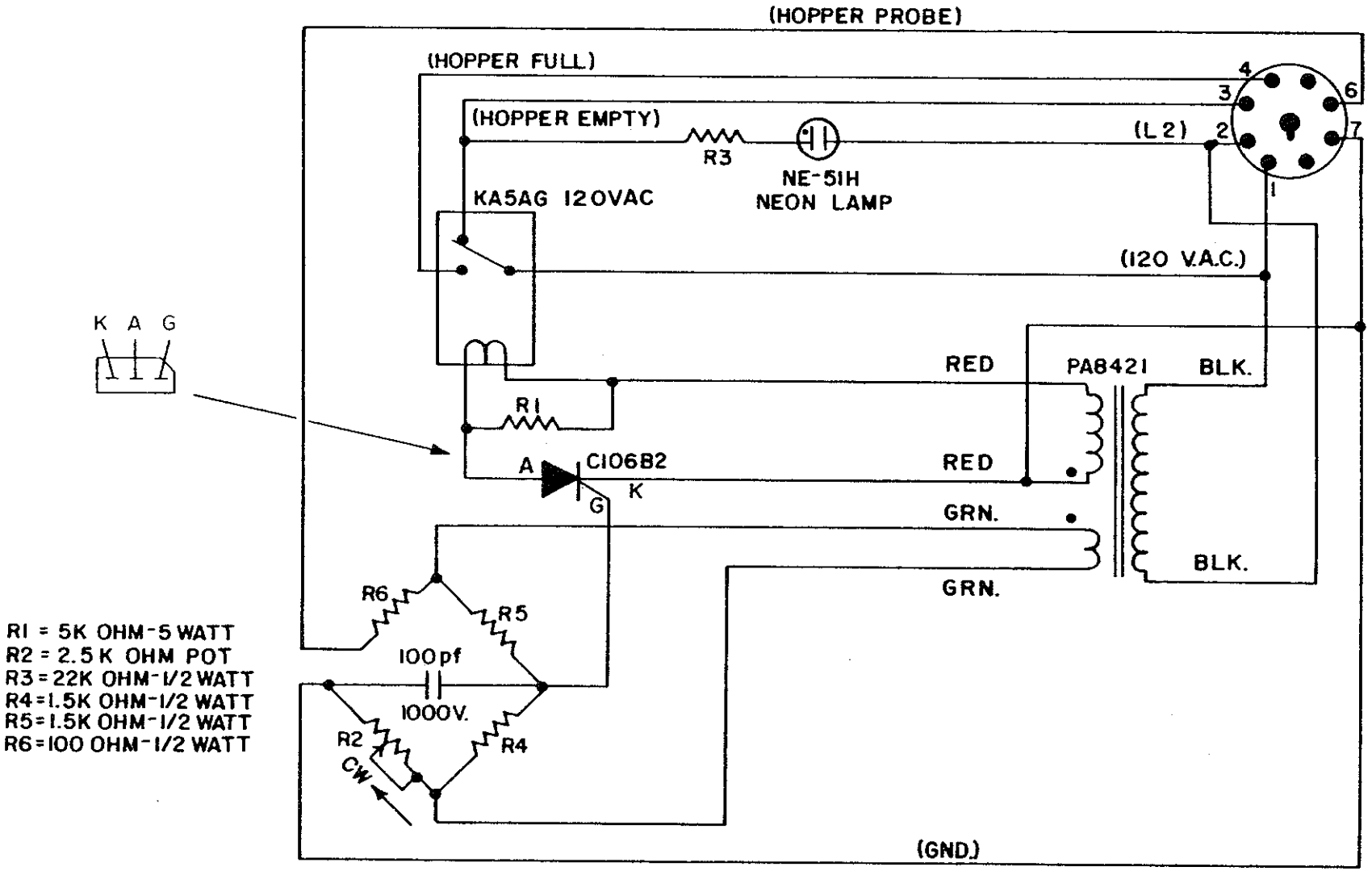
CONTROL CABLE TERMINATES AT COMPONENTS LOCATED ON DOOR, EXCEPT MIX STEPPING SWITCH.

INTERCONECTING WIRING TO LS BATCH CHASSIS AND EXTERNAL COMPONENTS SHOWN ON INDIVIDUAL PLANT WIRING DIAGRAM.

MIX-MIZER INC.
DIVISION OF COLUMBIA MACHINE INC.
KINGSPORT, TENNESSEE

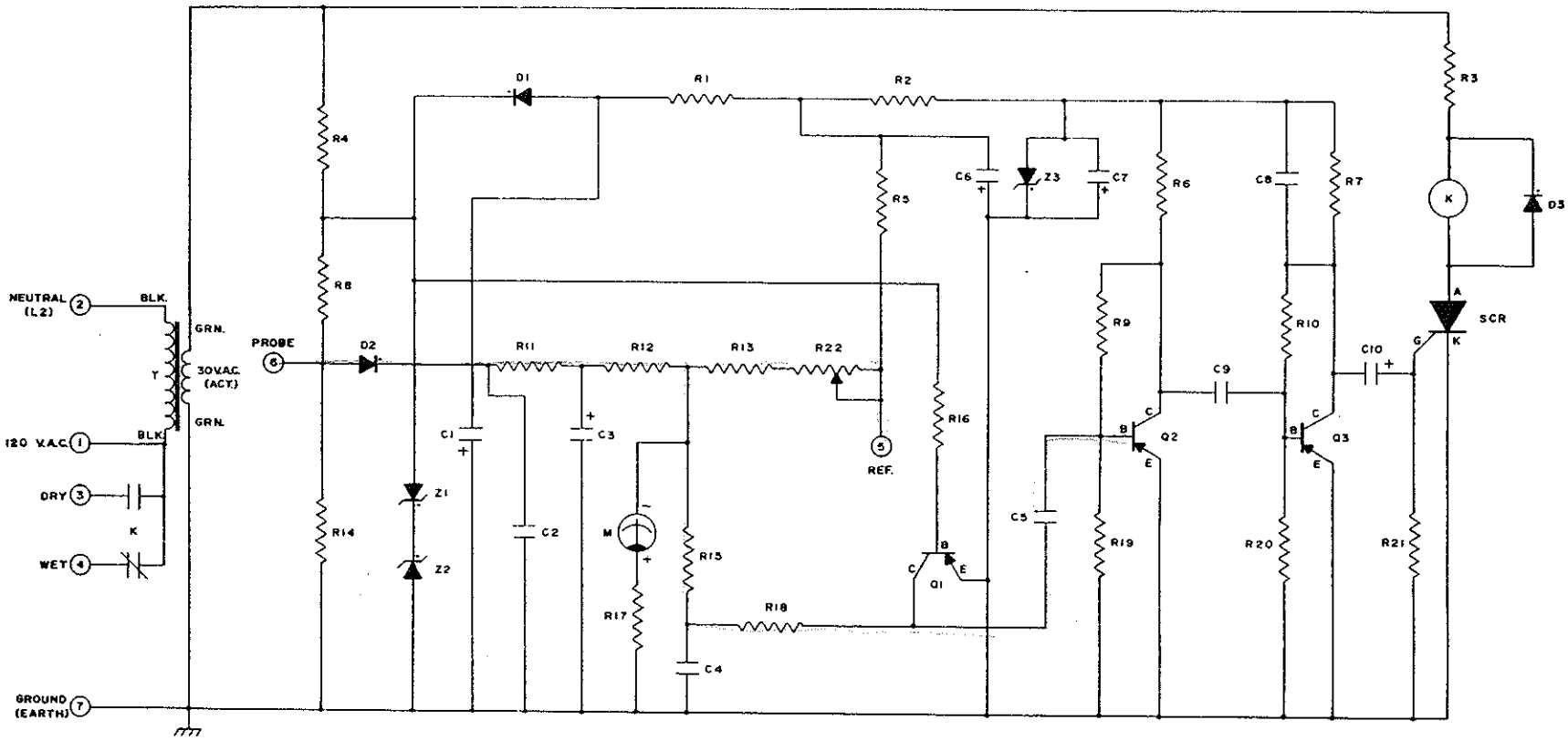
MODEL 4 MIX CONTROL
(AS USED WITH LS SYSTEM)

BY	DATE	NO.
VRL	1-6-72	3A1214



R1 = 5K OHM-5 WATT
R2 = 2.5 K OHM POT
R3 = 22K OHM-1/2 WATT
R4 = 1.5K OHM-1/2 WATT
R5 = 1.5K OHM-1/2 WATT
R6 = 100 OHM-1/2 WATT

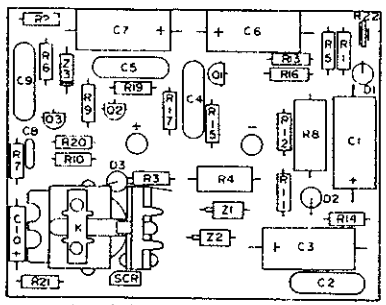
IA781 HOPPER MODULE



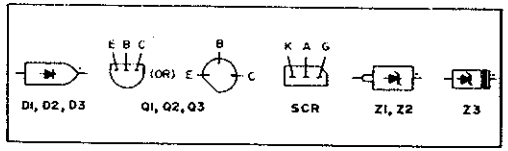
C1 – 250μF, 40 V. ELECT.
C2 – 1μF, 250V.
C3 – 250μF, 40 V. ELECT.
C4 – 1μF, 250V.
C5 – 1μF, 250V.
C6 – 250μF, 40V. ELECT.
C7 – 250μF, 40V. ELECT.
C8 – .047μF, 250V.
C9 – 1μF, 250V.
C10 – 25μF, 25V. ELECT.
D1 – BY127
D2 – BY127
D3 – BY127
K – KASAG, 24V.A.C.
M – 50-0-50μA.

Q1 – 2N4125
Q2 – 2N4125
Q3 – 2N4125
R1 – 330 OHMS 1/2 W.
R2 – 220 OHMS 1/2 W.
R3 – 120 OHMS 1/2 W.
R4 – 100 OHMS 2 W.
R5 – 1.2 K OHMS 1/2 W.
R6 – 10 K OHMS 1/2 W.
R7 – 10 K OHMS 1/2 W.
R8 – 500 OHMS 2 W.
R9 – 82 K OHMS 1/2 W.
R10 – 82 K OHMS 1/2 W.
R11 – 22 K OHMS 1/2 W.
R12 – 22 K OHMS 1/2 W.

R13 – 15 K OHMS 1/2 W.
R14 – 2.7 K OHMS 1/2 W.
R15 – 820 OHMS 1/2 W.
R16 – 3.3 MEGOHMS 1/2 W.
R17 – 100 K OHMS 1/2 W.
R18 – 10 K OHMS 1/2 W.
R19 – 22 K OHMS 1/2 W.
R20 – 22 K OHMS 1/2 W.
R21 – 22 K OHMS 1/2 W.
R22 – 10 K OHMS POT.
SCR – C10682
T – P-6469
Z1 – Z4XL228 (22V.)
Z2 – Z4XL228 (22V.)
Z3 – VR12A (12V.)



COMPONENT LOCATION DIAGRAM

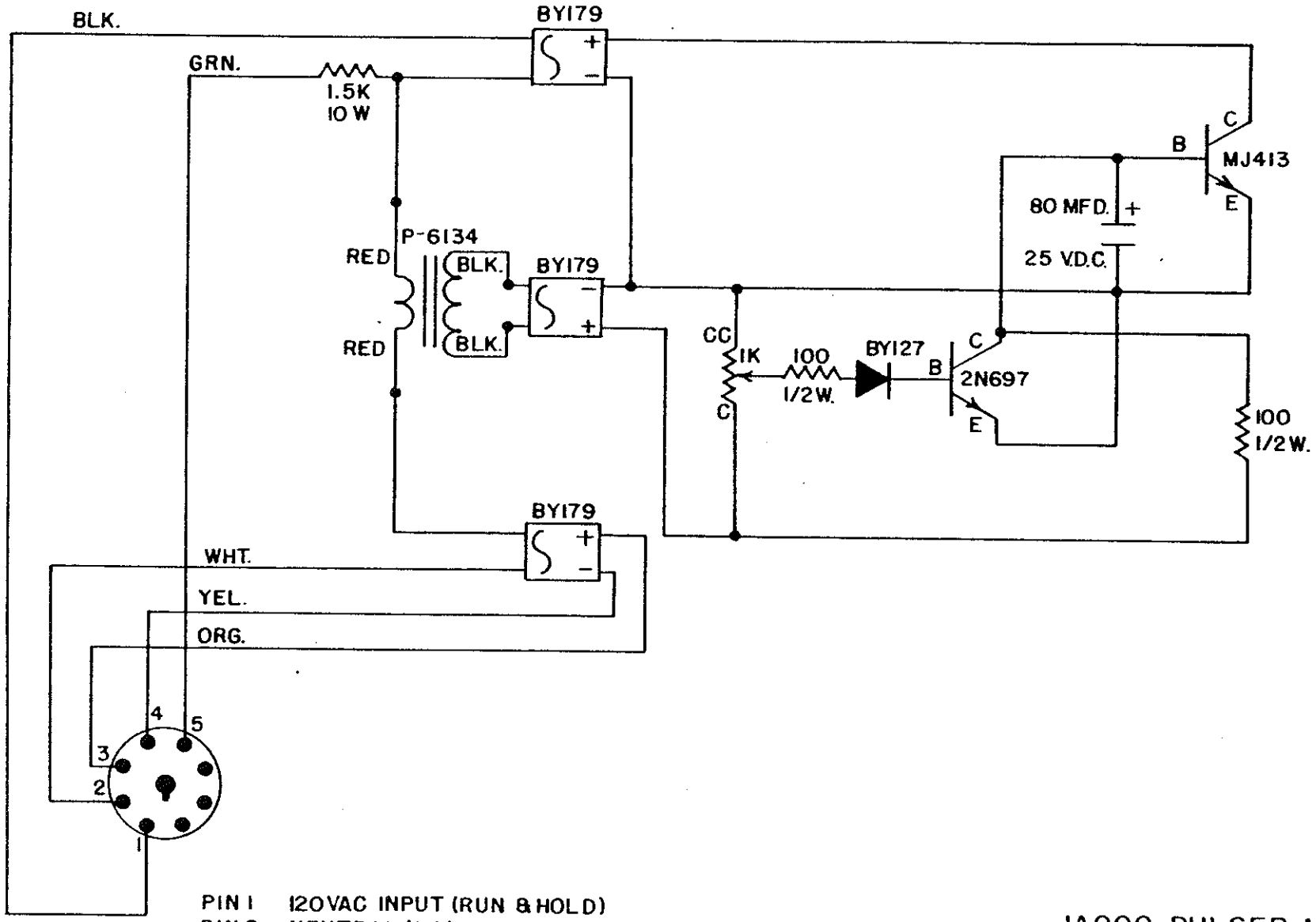


SEMICONDUCTOR CASE DIAGRAMS

MIX-MIZER, INC.
DIVISION OF COLUMBIA MACHINE
KINGSPORT, TENNESSEE

SOLID STATE MOISTURE MODULE

BY	DATE	DRAWING NO.
RAB	1-14-72	3A849 (REVISED)



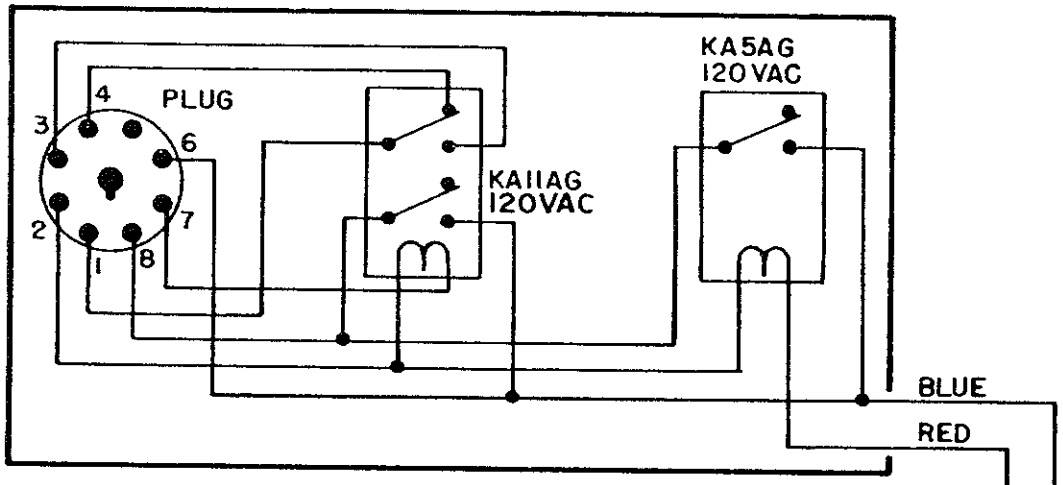
PIN 1 120VAC INPUT (RUN & HOLD)
PIN 2 NEUTRAL (L2)

PIN 3
PIN 4 OUTPUT TO STEPPING SWITCH SOLENOID

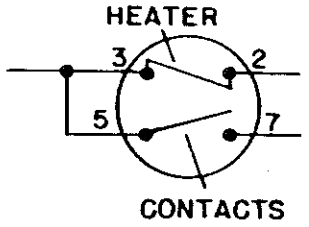
PIN 5 STEP SIGNAL INPUT (RUN)

1A900 PULSER MODULE
(BEGINNING WITH SER. NO. 6316)

UNIT-1 PLUGS INTO "PRE-WET"—"FINAL SELECTOR" SOCKET ON THE MIX CONTROL CHASSIS

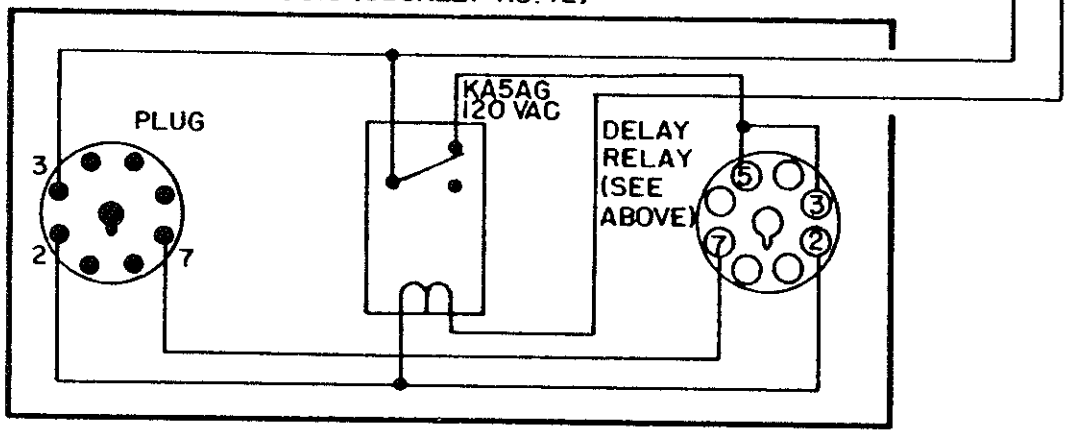


NORMALLY OPEN DELAY RELAY

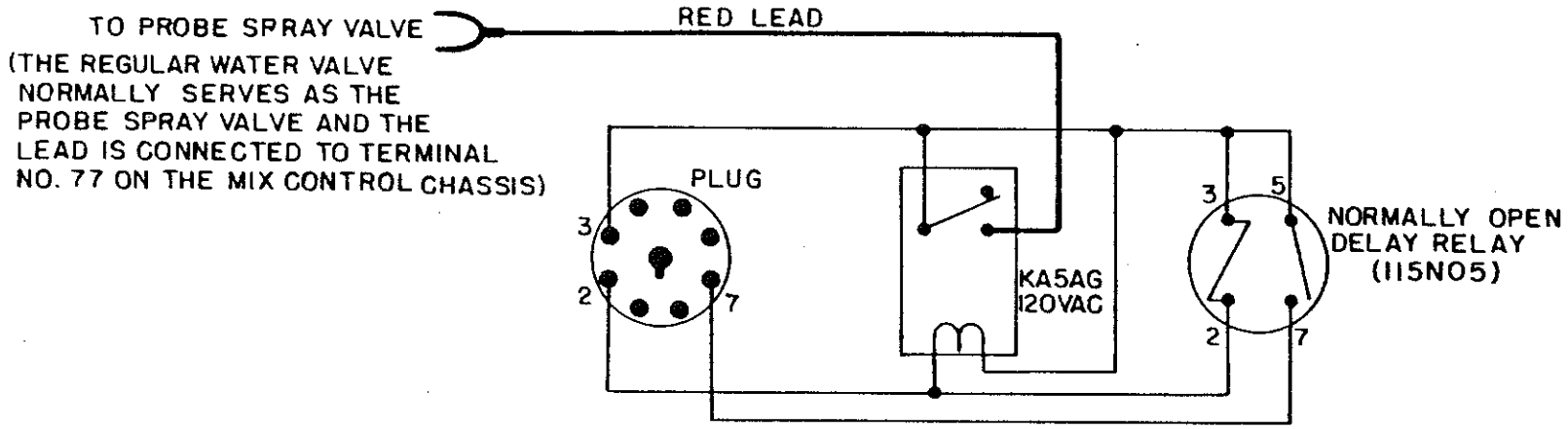


(115NO__)

UNIT-2 REPLACES A DELAY RELAY ON THE MIX CONTROL CHASSIS (USUALLY NO. 12)



1A1217 TRIM WATER ATTACHMENT

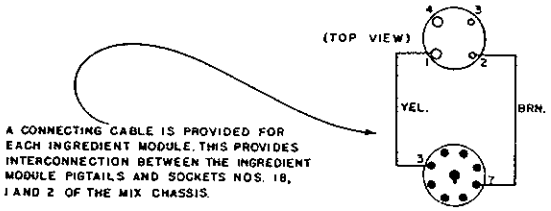


THIS MODULE IS NORMALLY PLUGGED INTO THE LAST DELAY RELAY SOCKET BEFORE AGGREGATES ENTER THE MIXER. FOR A LS SYSTEM THIS WILL USUALLY BE SOCKET NO. 17 ON THE MIX CONTROL CHASSIS. FOR WEIGH BATCH SYSTEM SOCKET NO. 18 IS USUALLY USED.

1A1218 PROBE SPRAY ATTACHMENT

GRAPHIC INDICATOR
PANEL

(WIRED IN ACCORDANCE WITH INDIVIDUAL
PLANT WIRING DIAGRAM)

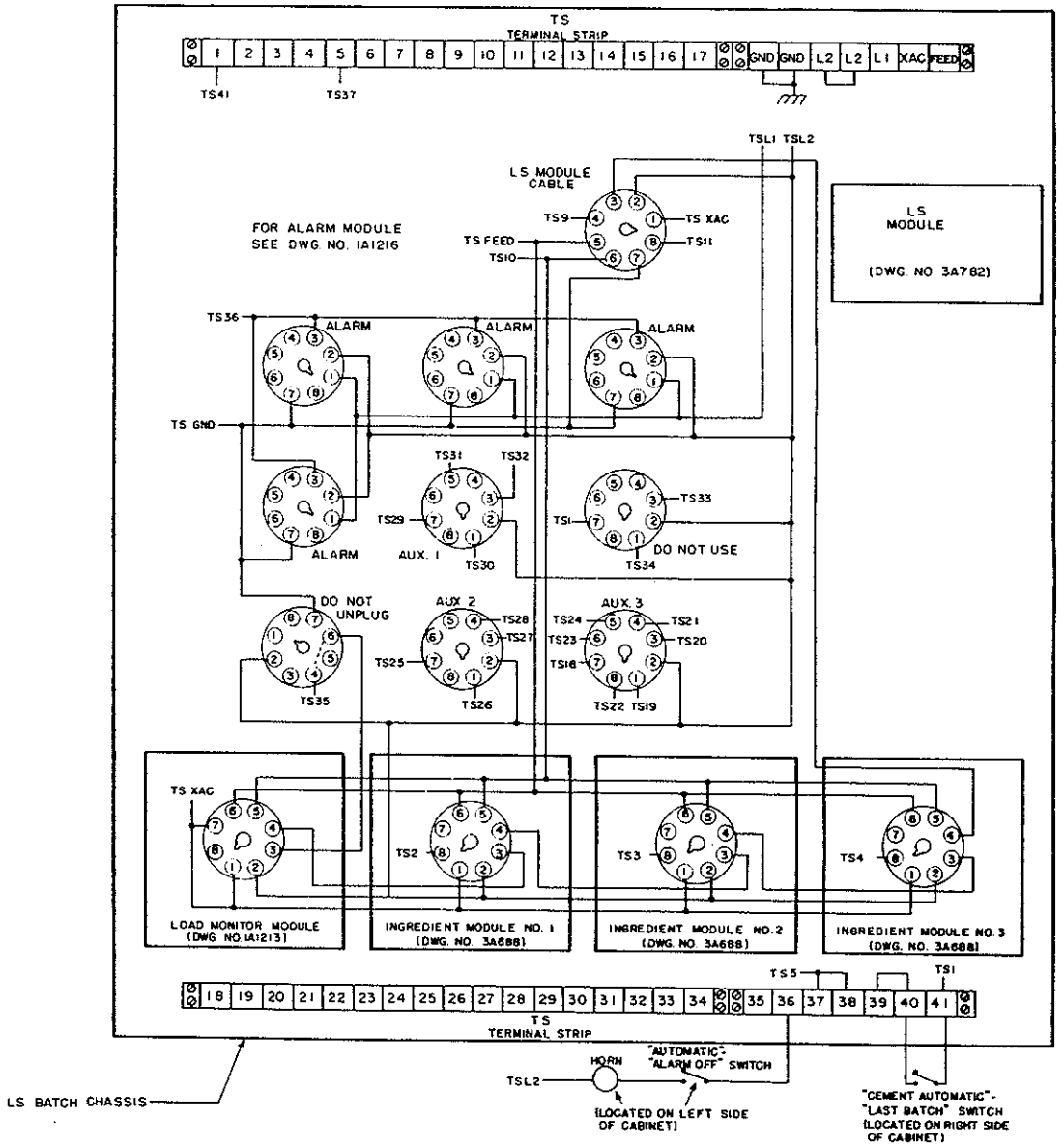


A CONNECTING CABLE IS PROVIDED FOR EACH INGREDIENT MODULE. THIS PROVIDES INTERCONNECTION BETWEEN THE INGREDIENT MODULE PIGTAILS AND SOCKETS NOS. 18, 1 AND 2 OF THE MIX CHASSIS.

NOTES

INTERCONNECTING WIRING TO MIX CHASSIS AND EXTERNAL COMPONENTS SHOWN ON INDIVIDUAL PLANT WIRING DIAGRAM.

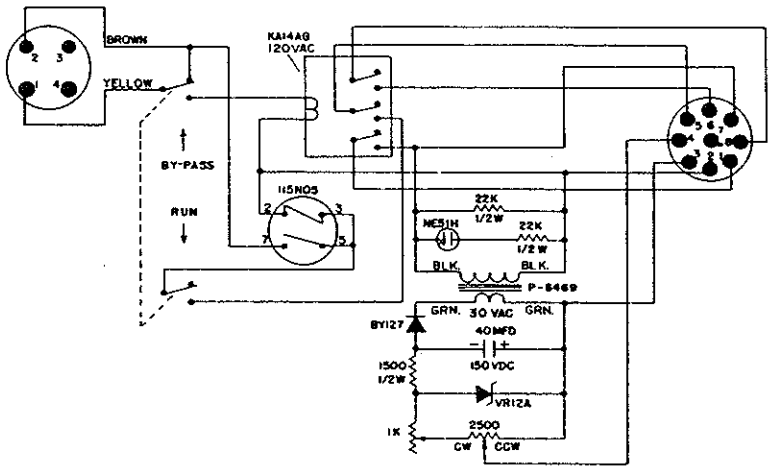
SPECIAL JUMPER PLUG (PIN 3 TO PIN 4) MUST BE INSTALLED IN EACH UNUSED INGREDIENT MODULE SOCKET.

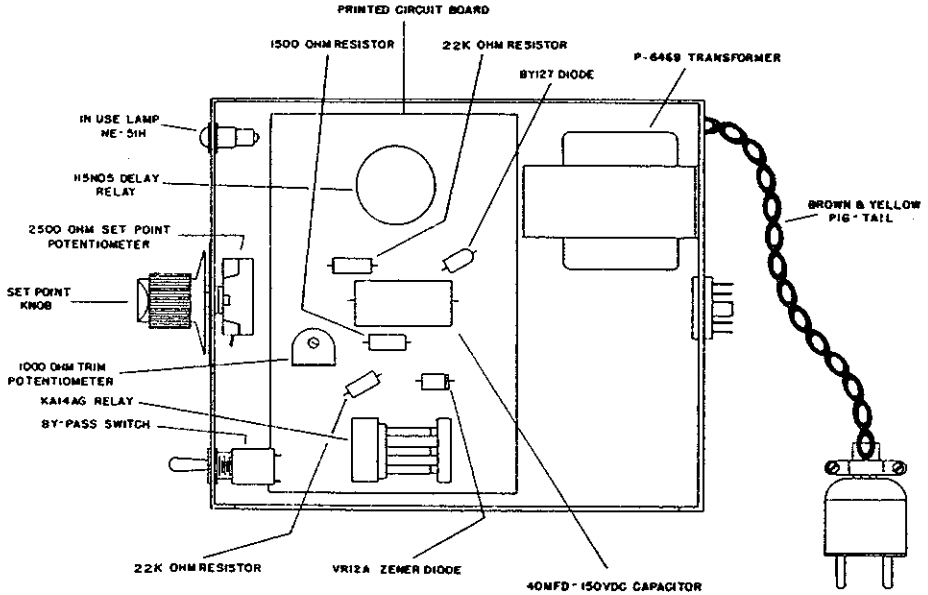


MIX-MIZER INC.
DIVISION OF COLUMBIA MACHINE INC.
KINGSPORT, TENNESSEE

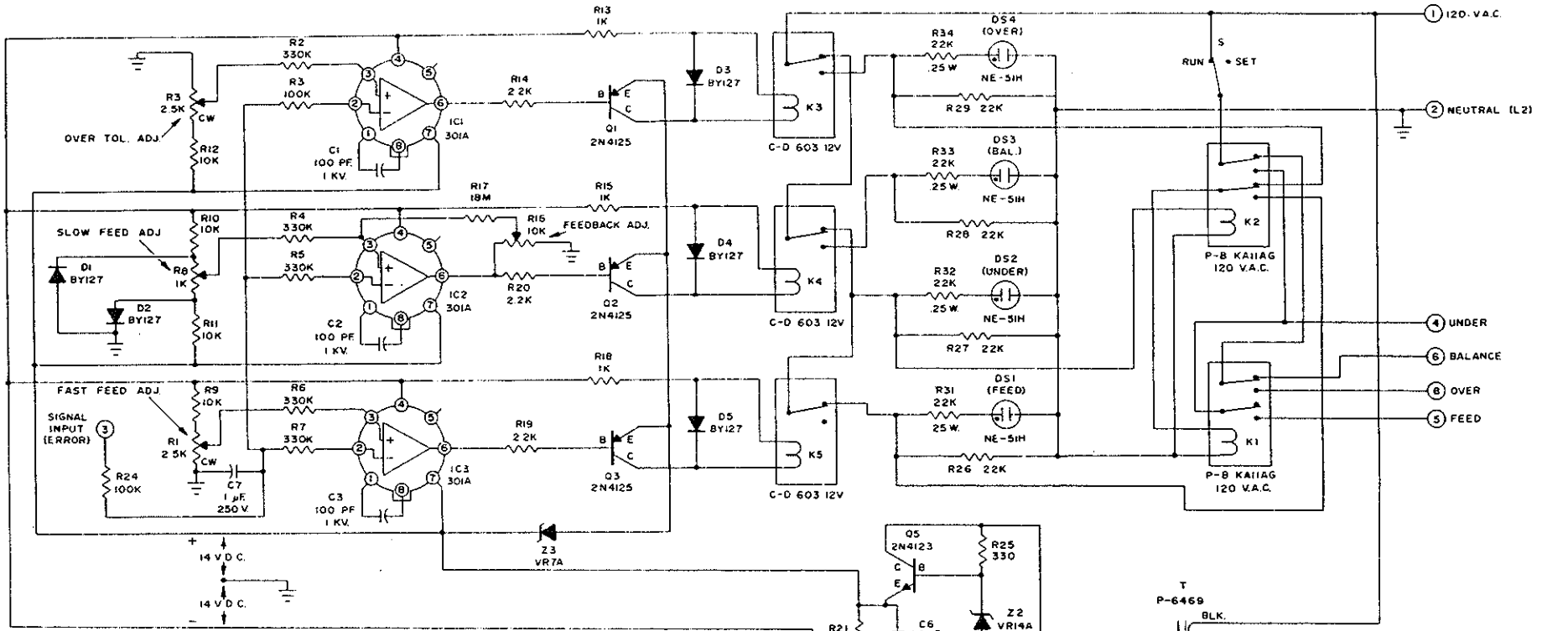
LS BATCH CONTROL

BY	DATE	NO.
VRL	1-7-72	3A1215

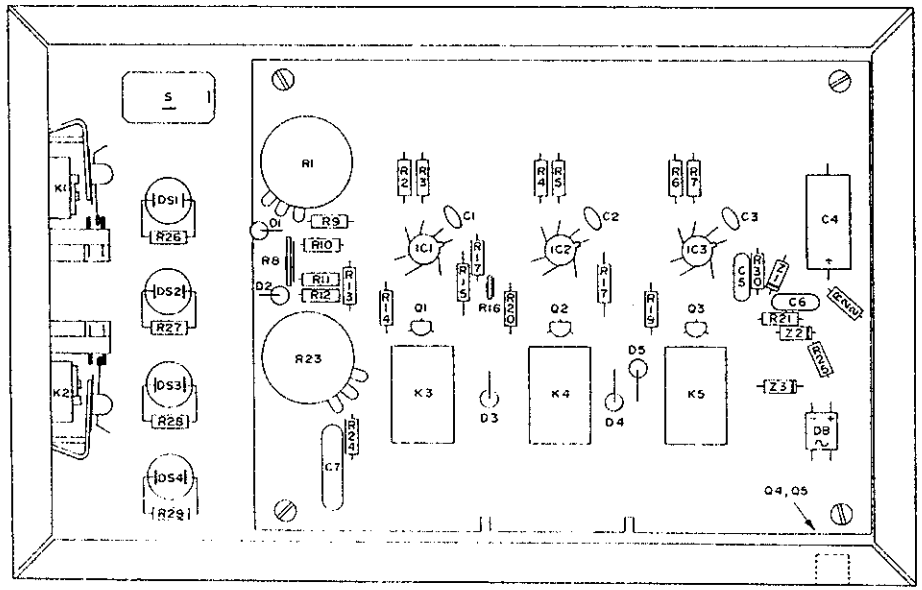




MIX-MIZER INC. DIVISION OF COLUMBIA MACHINE, INC. KINGSPORT, TENNESSEE			
INGREDIENT MODULE MODEL 3A688			
BY VRL	RUN HI-1	DATE 12-10-69	NO. 3A688

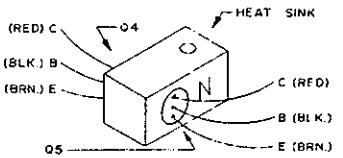


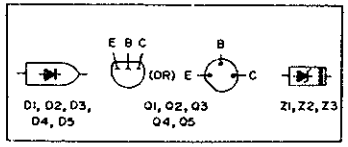
COMPONENT LOCATION DIAGRAM



NOTES:

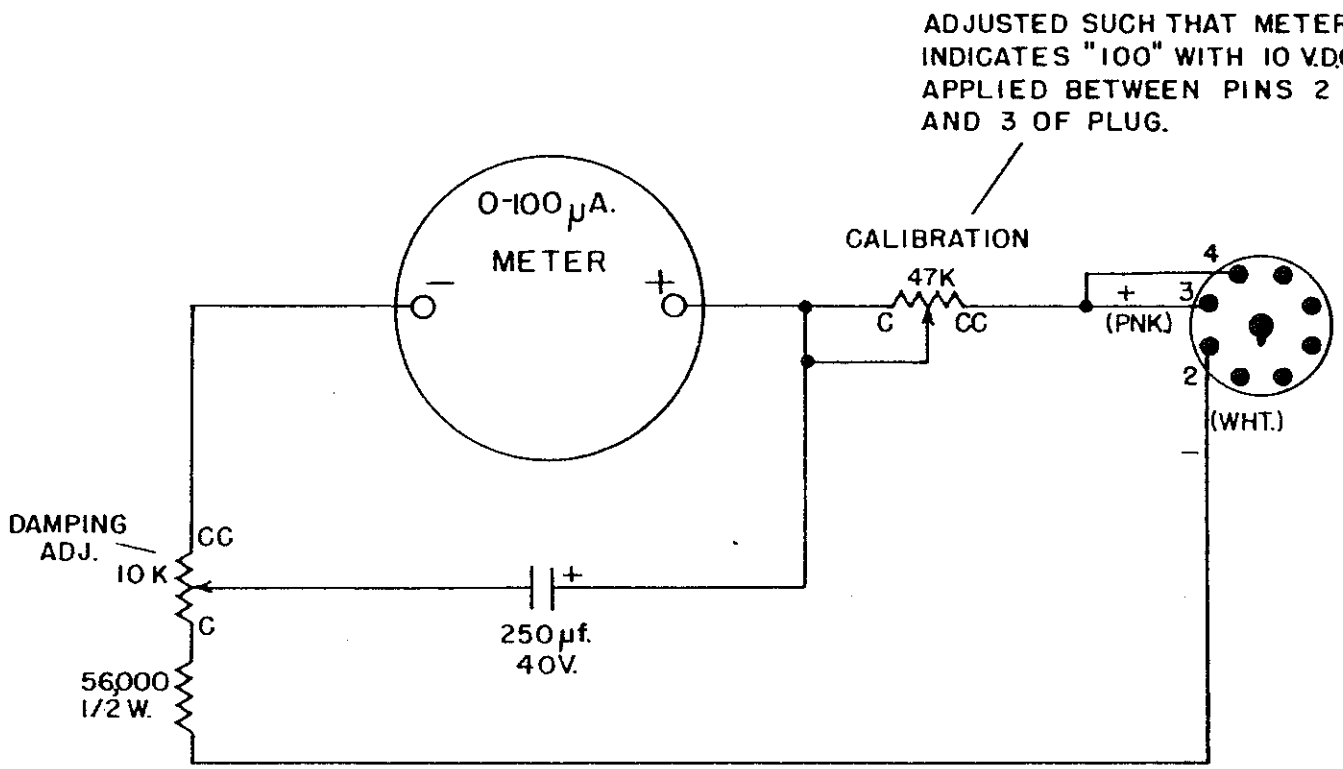
ALL RESISTANCE VALUES ARE IN OHMS.
ALL FIXED RESISTORS ARE .5 W, ±10% TOL., UNLESS OTHERWISE NOTED.
R31, R32, R33, R34 ARE INTEGRAL PARTS OF THEIR RESPECTIVE LAMP SOCKETS.
Q4, Q5 ARE MOUNTED IN A COMMON HEAT SINK WHICH IS LOCATED ON THE ALUMINUM CHASSIS.



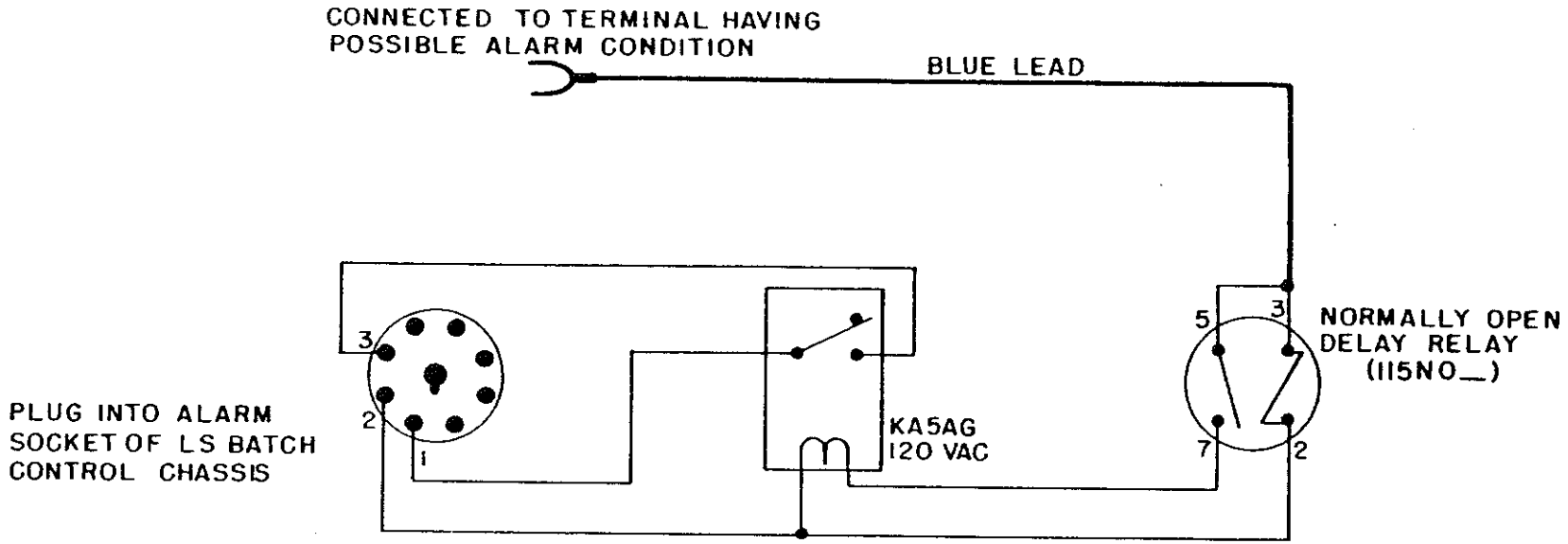


SEMICONDUCTOR CASE DIAGRAMS

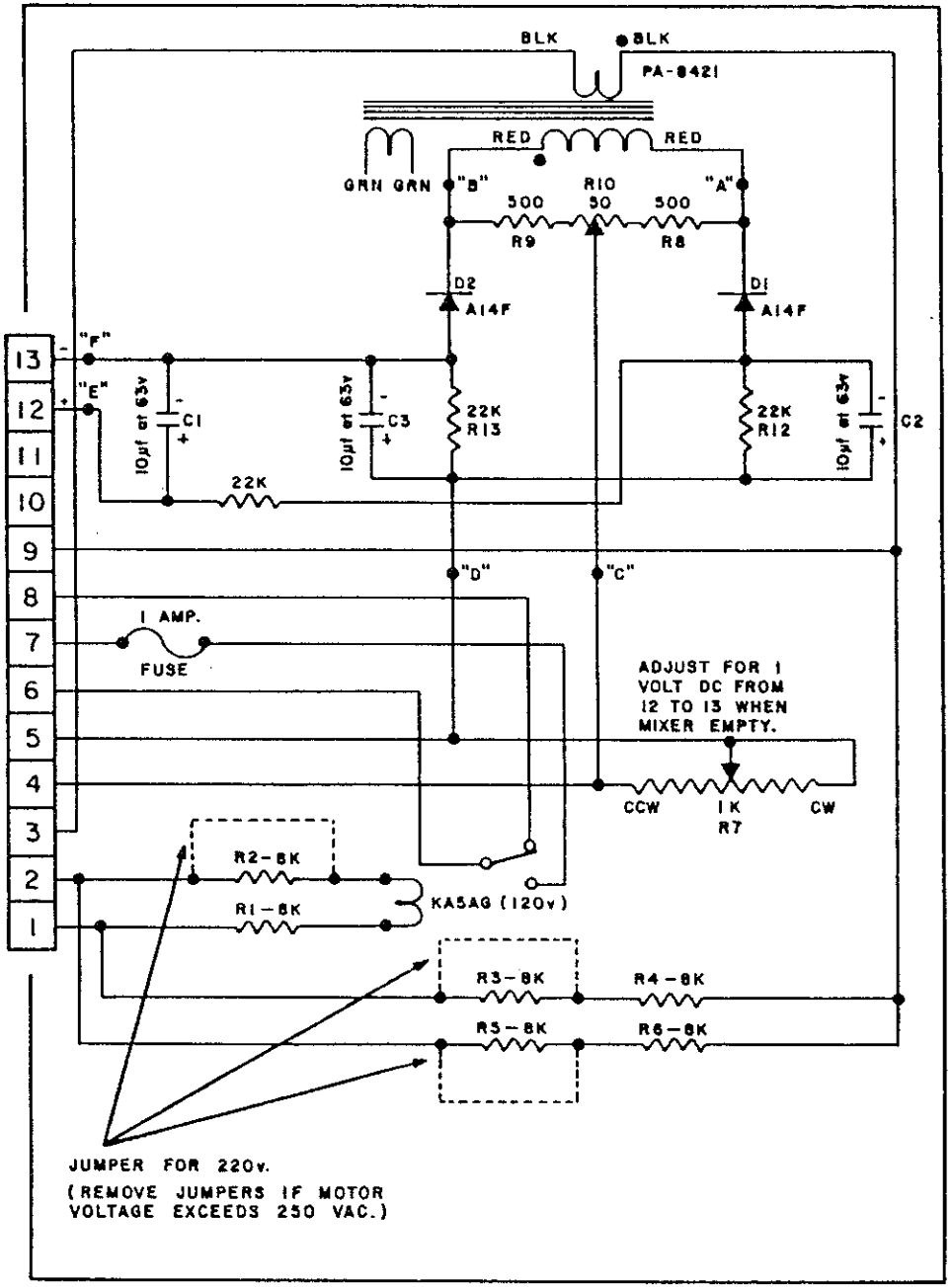
MIX-MIZER, INC.		
DIVISION OF COLUMBIA MACHINE, INC.		
KINGSPORT, TENNESSEE		
SOLID STATE L S MODULE		
MODEL 3A782-R		
(USING TYPE 301A INTEGRATED CIRCUITS)		
BY	DATE	DRAWING NO
RAB	1-21-72	3A782 (REVISED)



IA1213 LOAD MONITOR MODULE



IA1216 ALARM MODULE



8K RESISTORS ARE 10 WATTS
500 OHM RESISTORS ARE 5 WATTS
22K RESISTORS ARE 1/2 WATT
50 OHM POTENTIOMETER IS 2 WATTS
1K POTENTIOMETER IS 2-1/4 WATTS

LETTERS ADJACENT TO DOTS ON CONDUCTORS (EXAMPLE • A) DESIGNATE CIRCUIT BOARD TERMINATIONS.

DOTS ADJACENT TO TRANSFORMER LEADS DESIGNATE PROPER PHASING OF WINDINGS.

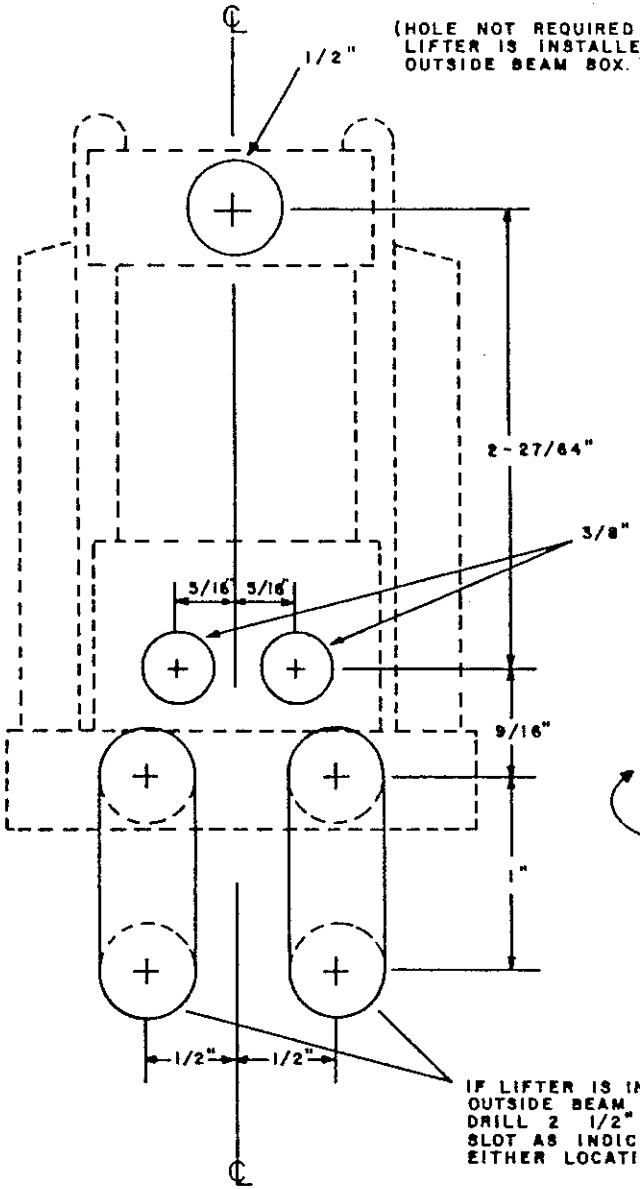
SUPERCEDES DWG. NO. 1A471

MIX-MIZER, INC.
DIVISION OF COLUMBIA MACHINE
KINGSPORT, TENNESSEE

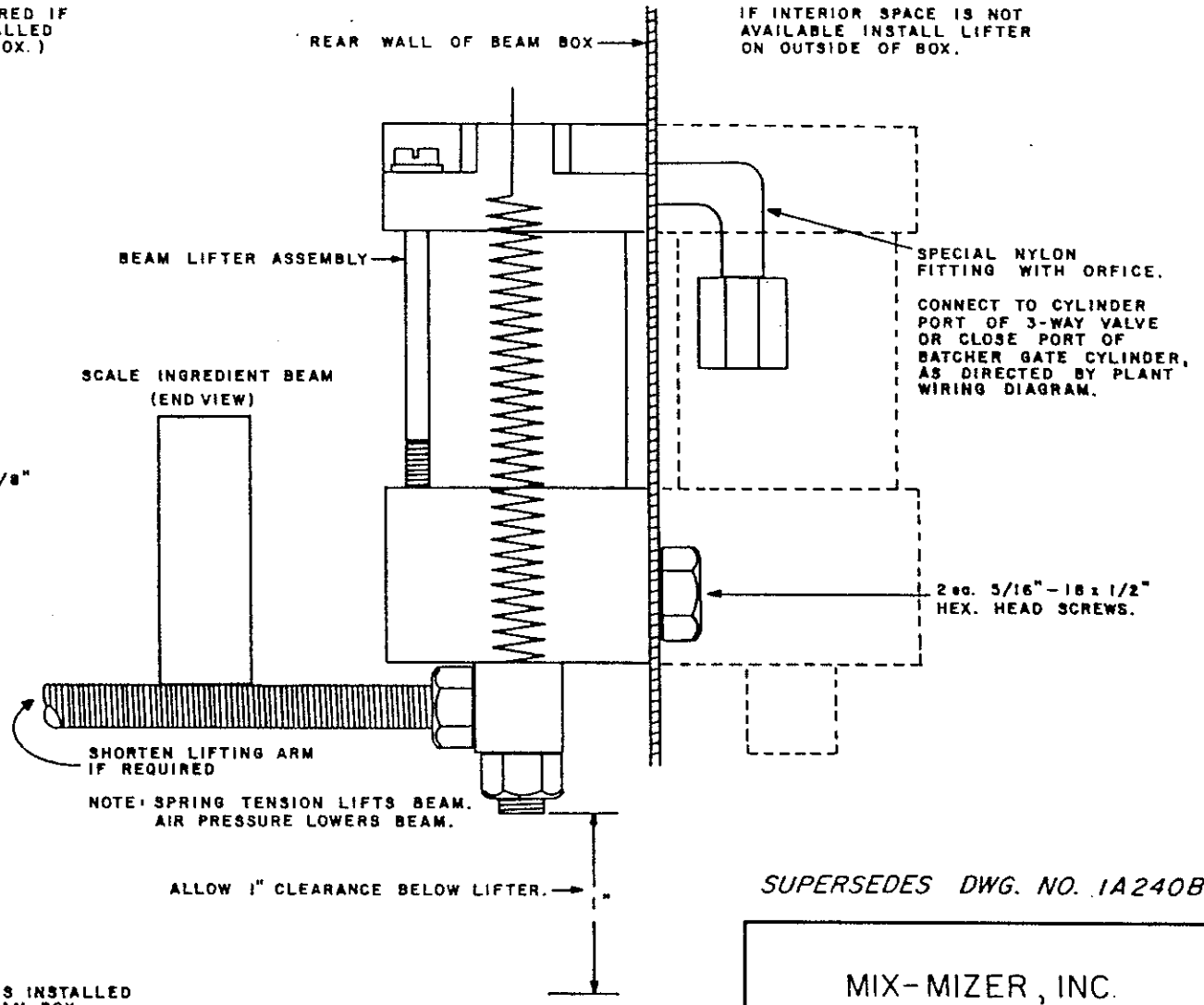
SCHEMATIC

MODEL 1A471 LSP
SENSITIVITY MODULE

BY	DATE	DWG. no.
RDM	8-25-78	1A471-R



IF LIFTER IS INSTALLED OUTSIDE BEAM BOX, DRILL 2 1/2" HOLES AND SLOT AS INDICATED AT EITHER LOCATION.



INSTALL LIFTER SUCH THAT INGREDIENT BEAM IS HELD IN SAME POSITION AS WITH EXISTING MANUAL LIFTER WHEN LOCKED.

IF LIFTER IS TO BE INSTALLED ON OUTSIDE OF BOX, CYLINDER HEAD AND LIFTING ARM MUST BE REVERSED.

BEAM LIFTER SHOULD NOT INTERFERE WITH NORMAL ADJUSTMENT OF INGREDIENT POISES OR MOVEMENT OF ANY COMPONENT(S).

NORMAL OPERATING PRESSURE 80 TO 100 P.S.I.G.

SUPERSEDES DWG. NO. 1A240B

MIX-MIZER, INC.
DIVISION OF COLUMBIA MACHINE
KINGSPORT, TENNESSEE

BEAM LIFTER

TEMPLATE AND INSTRUCTIONS

BY	DATE	DWG. no.
RDM	8-31-78	A1821

SPARE PARTS FOR LOAD SENSOR

ITEM	PART NO.	DESCRIPTION
1	233120	KRP11AG 120V Relay
2	560030	Zero Plug
3	251100	115N02 Delay Relay, 2 second
4	251102	115N05 Delay Relay, 5 second
5	251103	115N010 Delay Relay, 10 second
6	251104	115N015 Delay Relay, 15 second
7	251105	115N020 Delay Relay, 20 second
8	251106	115N030 Delay Relay, 30 second
9	251107	115N045 Delay Relay, 45 second
10	251108	115N060 Delay Relay, 60 second
11	251109	115N090 Delay Relay, 90 second
12	251110	115N0120 Delay Relay, 120 second
13	251111	115N0180 Delay Relay, 180 second
14	230019	Box (5) 1 Amp Slo-Blo Fuse
15	230025	Box (5) 3 Amp Slo-Blo Fuse
16	230040	Box (5) 10 Amp Plug Fuse
17	630309	ASCO Coil 120VAC (96-619-1)
18	630340	Parker Coil (46154)
19	103201	Beam Lift Cylinder
20	640001	1½" Vibrator, Model 5010
21	300007	Base, 1½" Vibrator
22	550070	Probe Spray Control
23	550065	Trim Water Attachment
24	103111	Spinks Scale
25	106001	Probe Insert,Machine Hopper
26	106010	Probe Holder, Machine Hopper