LEAD-ACID TYPE STORAGE BATTERIES

CONTINUOUS VARIABLE CURRENT CHARGE OPERATION BASED ON WATER LOSS

1. GENERAL

1.01 This section describes the continuous variable current charge operation of KS-5361 lead-acid type PBX storage batteries 100-ampere-hour capacity and smaller, where water loss is used as a basis for charging current adjustment.

Caution: This practice is not for use where there is voltage relay control of charge rate.

1.02 It is reissued to extend the scope to include all 10- to 100-ampere-hour batteries now being supplied by three different manufacturers. Changes are too general to justify use of arrows to mark changes.

1.03 The term charge rate as used herein refers to the current supplied by the charging source to the battery and load.

1.04 Charging current may be supplied over cable pairs from a central office or from a local charger. In either case, the charge rate is "fixed" in that it is not adjusted frequently to follow the load and hold the battery voltage or state of charge within narrow limits. There will be some discharge during the busy period each day. Part of this discharge will be replaced during the light load period (usually at night) but complete recharge, plus some excess, will be at the extended light-load period (usually at the week end).

1.05 Too high charge rate for the load involved results in excessive charging which will increase the water loss and reduce the life of the positive plates and separators. On the other hand, a charge rate that does not provide complete recharge will cause sulfation of the negative plates. Also, an excess of daily discharge over charge will reduce the battery capacity to an undesirably low value at some time during the week. The charge rate is a compromise between these opposite considerations and for each installation there is a maximum setting beyond which satisfactory operation is doubtful. Where loads are too great, a larger battery or some sort of charge control is desirable. Where loads are such that charge rates of the magnitude shown in column D of tables are required, some shorter life is to be expected and there is more danger of loss of board in case of unusually heavy loads. The supervisor should be notified if charge rates fall in column D and it might also be well to take occasional specific gravity readings near the end of the heavy load period to be sure reserves are not running too low.

1.06 With this method of operation the battery will be visited quarterly and the water loss, or drop in electrolyte level for the period will be read from a scale on the battery jar. If the water loss since the last visit is greater or less than normal the charge rate will be readjusted in accordance with the water loss tables herein. Normal loss for the various conditions is represented by the "0" values and calls for no change in the charge rate.

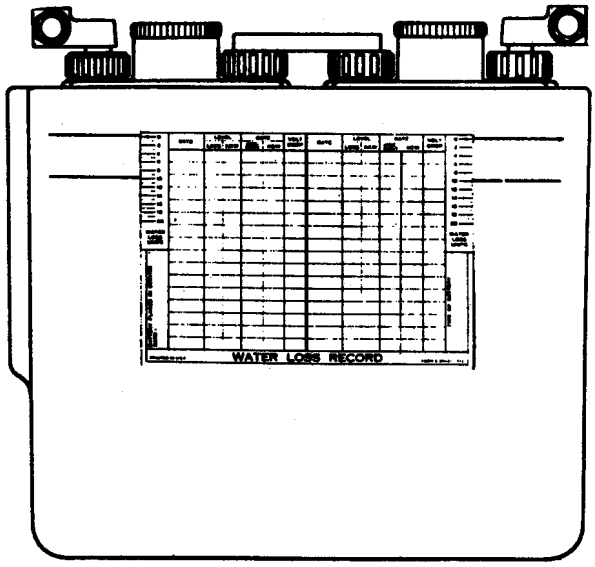

Fig. 1 - Battery Unit with Record

1.07 Attach an E-2544 record form (or one of the scales cut from the form) to the jar of one cell of the string with zero on one of the scales on the form even with maximum level and cross off the scale not to be used. The gum on form E-2544 should be moistened with water before attaching the form to glass containers. For transparent moulded plastic containers cut the scale from the form and fasten the scale only on the jar using transparent scotch tape. In this case, it is particularly important that zero on the scale be exactly at the high level line so that it can be replaced, if detached, without spoiling the records.

1.08 In observing the level, the best results will be obtained by placing a light so that the rear of the cell is illuminated. Sight from below the surface of the electrolyte, slowly raising the eye until the rear edge of the surface lines up with the front edge. Then note the corresponding point on the scale of the form as shown in Fig. 2.

Fig. 2 - Electrolyte Level (Cross Section of Cell)

1.09 Water loss should be checked, charge rate changed, if necessary, and electrolyte level returned to maximum every month until approximately correct and after that every three months. For the purpose of this section "one month" shall be 28 to 32 days and "three months" shall be 12 to 14 weeks.

1.10 In some special cases it may be necessary to vary the charge rate to take care of anticipated seasonal loads. The charge rate for the previous corresponding period will be an indication of the proper rate.

1.11 The PBX attendant should be asked to inform the Telephone Company if the white charge-indicator of list 120 or 120A cells falls below the lower line or if the white or red indicators of any cell drop to bottom of cage. In some cases, particularly on cells of C & D manufacture, water added to the cell may so dilute the electrolyte at the top of the cell that the white charge indicators will drop when the cells are only slightly discharged. Gassing over the weekend will usually correct this condition and some improvement can be made by carefully filling and discharging a hydrometer several times at the top of the cell to promote mixing. Where this condition occurs regularly or frequently at a particular PBX, special trips in answer to indicator down reports may be omitted between date of adding water and the next weekend low-load period.

1.12 Where two parallel strings of the same size battery have practically the same water loss, this method may be applied, doubling the allowable "Present Charge Rates" at the head of each column and doubling the "required mils.-change" listed for each number of water loss units.

1.13 Except where special corrective action has been recommended for a particular battery, these routines apply at all room temperatures between electrolyte freezing temperature and 100F and for cells with full-charge corrected specific gravity below 1.225. Temperatures below 80F are preferred. Where average temperatures for the 24-hour day exceed 100F special operating methods may be necessary.

1.14 See Section 157-601-701 for maximum and minimum levels, approved water, precautions against explosions, spilled electrolyte, etc.

Caution: Avoid creation of sparks, including those from static electricity, or the use of an open flame near batteries since the gas given off by the battery is explosive.

2. APPARATUS

List of Tools, Gauges and Materials. (Equivalents may be substituted.)

2.01 Cord, W1U

2.02 Flashlight, Regular

2.03 Volt-Ammeter, D.C., Weston Model No. 280, 60-30-3 volts, 15-3-.3 amperes, equipped with cords and clips.

3. METHOD

3.01 In the absence of local instructions or experience to the contrary, set the charge rate initially at approximately 120 per cent of the average 24 hour working day load; or if this is difficult to determine, set it at two-fifths of the busy hour load. Observations at monthly intervals are suggested until water loss is from 1 to 9 units after which it should go on a three months schedule. Operation for more than a few months on a one month schedule is not recommended.

3.02 Attached hereto are Water Loss Tables for the different sizes of cells, different load weeks and different manufacturers as follows:

KS-5361 Lists	Table Numbers		
	Exide	Gould	C & D
110 to 116B		2	3
120 & 120A	5	6	7
130 & 130A	9	10	
140, 140A, 141, & 141A	13	13	
150, 150A, 151, & 151A	17	17	17

Index of Tables.

Example: Assume an Exide List 120 battery. Above index indicates that Table 5 applies. Also assume a 5-day board and that last recorded "new rate" was 140 mils. Column B is indicated. If the water loss in 3 months was 8 units, the correction is -20 mils. Measure the present charge rate and decrease it 20 mils.

Procedure for Regular Battery Maintenance Visit

3.03 From the permanently attached record form determine the water loss and the

interval since the last visit. Based on the last recorded charge rate, determine from the water loss tables if a change in the rate is required. If a change is required measure the present rate and make the change as accurately as feasible. Add water carefully to raise the level just to the "0" line on the form. See example above.

3.04 Except for arbitrary adjustments made to correct for special conditions such as seasonal load changes, charge rate changes should not be larger than the values given in the tables.

3.05 In the tables, "Present Chg. Rate - Amps" refers to the output of the charging source in amperes and is the last or "new" rate recorded on the water loss record. Columns A, B, C, and D apply to different charge rate ranges. Note that they are for different length weeks, that is, 5, 5 1/2, 6 or 7 days. "1 Mo.", "3 Mo.", and "Required Mils. Change" refer to the time interval since the last filling with water and to the milliamperes to change the charge rate. The "+" values are for increase, the "-" values for decrease and "0" is the approved loss and requires no change. "Water Loss Units" refers to the number of units of water lost since the last refilling.

Procedure if electrolyte is below minimum level or on lists 120 or 120A cells, if white indicator is below white line.

3.06 This is an indication of excessive charge which may be due to a general decrease in load. Ascertain from the attendart whether the board has been idle or not busy and whether this condition is likely to continue. If the decrease in load is expected to be only temporary, add water and make no change in the charge rate. If the decreased load is expected to continue, reduce the charge rate in accordance with the tables. If a trouble condition is found, clear the trouble, add water and reset charge rate to the value last recorded.

Procedure if white or red charge-indicators are at bottom of cage.

3.07 This is an indication of undercharge. The cause and procedure for undercharge involves so many variables that it is impractical to set up analysis or procedure for every condition. However, the following should cover most of the cases.

(a) Trouble condition may have reduced the charge rate since the last inspection.

(b) In some cases abnormally heavy load may discharge the battery sufficiently by the end of the week to permit the white indicator to fall. This is most likely to occur when the battery has become weak or if the battery is too small for the PBX load. At the end of the idle period the battery will usually be charged sufficiently to at least cause the white indicator to float.

(c) If the water loss is normal or greater, considering the time elapsed since the last refilling, it is evident that the charge rate is sufficient and that the undercharge is probably due to a weak battery, a trouble condition which caused temporary heavy load, or possibly a general increase in load.

(d) If the water loss is normal or less, the charge rate may be too low, probably due to some general increase in traffic which may be ascertained from the attendant.

(e) Dilution immediately after filling. See 1.11.

3.08 Correct any trouble conditions and restore reserve capacity by either replacing or recharging the battery. Ordinarily the battery should be replaced if it is fully discharged or is evidently in relatively poor condition as indicated by the results of the last discharge test or by observation considering the age of the battery. If the battery is replaced the following rates are recommended as a trial until the next regular visit.

Cause of Undercharge	New Charge Rate
Reduced charge rate due to trouble.	Same as before discharge condition.
High drain due to trouble condition.	Same as before discharge condition.
Increased PBX load.	25% more than last regular setting.

3.09 If the battery is not replaced, increase the charge rate depending on local conditions, the extent and cause of discharge and whether the following period is one of light or heavy load. For example:

(a) If the battery is only slightly discharged and the following period is one of light or no load, it is suggested that the charge rate be increased 25% as a trial until the next regular visit.

(b) If the battery is discharged considerably, charge it for 5 to 10 days at the maximum rate available, which should be at least double the present rate but not to exceed the nominal charge rate of the battery. Shorting the charge lead rheostat or resistor with a cord may be necessary to obtain this charge. After the battery is recharged, readjust the rate as covered above for a new battery.

3.10 Where red indicators are down frequently, the load is too great for the size of battery used (see 1.04), or there is too much dilution after filling (see 1.11).

3.11 If there is any question as to the condition of the battery, it may be desirable to apply a discharge capacity test after the battery is recharged. See Section 157-601-501 for discharge test of 10- or 15-ampere-hour cells and 157-601-502 for 30-, 50-, and 100-ampere-hour cells.

4. RECORDS

4.01 Record on the water loss record form E-2544 date of each battery visit.

4.02 Each time water is added, record "Loss" since last change of level and the new level (usually "0"). If, as is recommended, the level at each filling is returned to "0" the "Loss" in units may be read directly from the scale.

TABLE 5

EXIDE KS-5361 Lists 120-120A

A		DAYS	B		C		DAYS	D	
PRESENT CHG. RATE-AMPS.		PER WK.	PRESENT CHG. RATE-AMPS.		PRESENT CHG. RATE-AMPS.		PER WK.	PRESENT CHG. RATE-AMPS.	
0-.140		7	.141-.235		.236-.315		7	.316-.395	
0-.115		6	.116-.190		.191-.250		6	.251-.315	
0-.095		5 1/2	.096-.160		.161-.210		5 1/2	.211-.260	
0-.095		5	.096-.160		.161-.210		5	.211-.260	
REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE		REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE	
1 MO.	3 MO.	UNITS	1 MO.	3 MO.	1 MO.	3 MO.	UNITS	1 MO.	3 MO.
+45	+30	0	+65	+35	+65	+40	0	+65	+50
+20	+15	1	+20	+20	+20	+30	1	+20	+35
0	+5	2	0	+15	0	+20	2	0	+30
-20	0	3	-20	+5	-20	+15	3	-20	+20
-40	0	4	-40	0	-40	+5	4	-40	+15
-45	-5	5	-65	0	-65	0	5	-65	+5
-45	-15	6	-80	-5	-85	0	6	-85	0
-45	-20	7	-80	-15	-105	-5	7	-105	0
-45	-30	8	-80	-20	-105	-15	8	-125	-5
-45	-35	9	-80	-30	-105	-20	9	-130	-15
-45	-45	More	-80	-40	-105	-35	More	-130	-30

TABLE 2

GOULD KS-5361 Lists 110-116A

A		DAYS	B		C		DAYS	D	
PRESENT CHG. RATE-AMPS.		PER WK.	PRESENT CHG. RATE-AMPS.		PRESENT CHG. RATE-AMPS		PER WK.	PRESENT CHG. RATE-AMPS	
0-.090		7	.091-.160		.161-.210		7	.211-.265	
0-.075		6	.076-.125		.126-.170		6	.171-.210	
0-.065		5 1/2	.066-.105		.106-.140		5 1/2	.141-.170	
0-.065		5	.066-.105		.106-.140		5	.141-.170	
REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE		REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE	
1 MO.	3 MO.	UNITS	1 MO.	3 MO.	1 MO.	3 MO.	UNITS	1 MO.	3 MO.
+30	+25	0	+50	+30	+50	+30	0	+50	+35
+15	+10	1	+15	+15	+15	+15	1	+15	+25
0	+5	2	0	+10	0	+10	2	0	+15
-15	0	3	-15	+5	-15	+5	3	-15	+10
-30	0	4	-35	0	-35	0	4	-35	+5
-30	-5	5	-50	0	-50	0	5	-50	0
-30	-10	6	-55	-5	-70	-5	6	-70	-5
-30	-15	7	-55	-10	-70	-10	7	-85	-10
-30	-25	8	-55	-15	-70	-15	8	-85	-15
-30	-30	9	-55	-25	-70	-25	9	-85	-25
-30	-30	10	-55	-30	-70	-30	10	-85	-30
-30	-30	More	-55	-40	-70	-40	More	-85	-40

TABLE 6

GOULD KS-5361 Lists 120-120A

A		DAYS	B		C		DAYS	D	
PRESENT CHG. RATE-AMPS.		PER WK.	PRESENT CHG. RATE-AMPS.		PRESENT CHG. RATE-AMPS.		PER WK.	PRESENT CHG. RATE-AMPS.	
0-.140		7	.141-.235		.236-.315		7	.316-.395	
0-.115		6	.116-.190		.191-.250		6	.251-.315	
0-.095		5 1/2	.096-.160		.161-.210		5 1/2	.211-.260	
0-.095		5	.096-.160		.161-.210		5	.211-.260	
REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE		REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE	
1 MO.	3 MO.	UNITS	1 MO.	3 MO.	1 MO.	3 MO.	UNITS	1 MO.	3 MO.
+45	+35	0	+75	+40	+75	+40	0	+75	+50
+25	+15	1	+25	+25	+25	+25	1	+25	+35
0	+10	2	0	+15	0	+15	2	0	+25
-25	0	3	-25	+10	-25	+10	3	-25	+15
-45	0	4	-50	0	-50	0	4	-50	+10
-45	-10	5	-75	0	-75	0	5	-75	0
-45	-15	6	-80	-10	-100	-10	6	-100	-10
-45	-25	7	-80	-15	-105	-15	7	-125	-15
-45	-35	8	-80	-25	-105	-25	8	-130	-25
-45	-40	9	-80	-35	-105	-35	9	-130	-35
-45	-45	10	-80	-40	-105	-40	10	-130	-40
-45	-45	More	-80	-60	-105	-60	More	-130	-60

TABLE 3

C&D KS-5361 Lists 110-116A

A		DAYS	B		C		DAYS	D	
PRESENT CHG. RATE-AMPS.		PER WK.	PRESENT CHG. RATE-AMPS.		PRESENT CHG. RATE-AMPS.		PER WK.	PRESENT CHG. RATE-AMPS.	
0-.090		7	.091-.160		.161-.210		7	.211-.265	
0-.075		6	.076-.125		.126-.170		6	.171-.210	
0-.065		5 1/2	.066-.105		.106-.140		5 1/2	.141-.170	
0-.065		5	.066-.105		.106-.140		5	.141-.170	
REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE		REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE	
1 MO.	3 MO.	UNITS	1 MO.	3 MO.	1 MO.	3 MO.	UNITS	1 MO.	3 MO.
+30	+30	0	+55	+40	+70	+40	0	+85	+55
+30	+20	1	+30	+20	+30	+20	1	+30	+30
0	+10	2	0	+10	0	+10	2	0	+20
-30	0	3	-30	0	-30	0	3	-30	+10
-30	-10	4	-55	0	-65	0	4	-65	0
-30	-20	5	-55	-10	-70	-10	5	-85	-10
-30	-30	6	-55	-20	-70	-20	6	-85	-20
-30	-30	7	-55	-30	-70	-30	7	-85	-30
-30	-30	8	-55	-40	-70	-40	8	-85	-40
-30	-30	9	-55	-55	-70	-55	9	-85	-55
-30	-30	More	-55	-55	-70	-70	More	-85	-70

TABLE 7

C&D KS-5361 Lists 120-120A

A		DAYS	B		C		DAYS	D	
PRESENT CHG. RATE-AMPS.		PER WK.	PRESENT CHG. RATE-AMPS.		PRESENT CHG. RATE-AMPS.		PER WK.	PRESENT CHG. RATE-AMPS.	
0-.140		7	.141-.235		.236-.315		7	.316-.395	
0-.115		6	.116-.190		.191-.250		6	.251-.315	
0-.095		5 1/2	.096-.160		.161-.210		5 1/2	.211-.260	
0-.095		5	.096-.160		.161-.210		5	.211-.260	
REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE		REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE	
1 MO.	3 MO.	UNITS	1 MO.	3 MO.	1 MO.	3 MO.	UNITS	1 MO.	3 MO.
+45	+45	0	+80	+75	+95	+85	0	+95	+85
+30	+40	1	+30	+55	+30	+65	1	+30	+65
0	+30	2	0	+40	0	+55	2	0	+55
-30	+20	3	-30	+30	0	+40	3	0	+40
-45	+10	4	-65	+20	-30	+30	4	-30	+30
-45	0	5	-80	+10	-65	+20	5	-65	+20
-45	0	6	-80	0	-95	+10	6	-95	+10
-45	0	7	-80	0	-105	0	7	-125	0
-45	-10	8	-80	0	-105	0	8	-130	0
-45	-20	9	-80	-10	-105	-10	9	-130	-10
-45	-40	More	-80	-30	-105	-30	More	-130	-30

TABLE 9

EXIDE KS-5361 Lists 130-130A

A		DAYS	B		C		DAYS	D	
PRESENT CHG. RATE-AMPS.		PER	PRESENT CHG. RATE-AMPS.		PRESENT CHG. RATE-AMPS.		PER	PRESENT CHG. RATE-AMPS.	
0-.275		7	.276-.475		.476-.630		7	.631-.790	
0-.225		6	.226-.380		.381-.505		6	.506-.625	
0-.190		5 1/2	.191-.315		.316-.420		5 1/2	.421-.510	
0-.190		5	.191-.315		.316-.420		5	.421-.510	
REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE		REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE	
1 MO.	3 MO.	UNITS	1 MO.	3 MO.	1 MO.	3 MO.	UNITS	1 MO.	3 MO.
+100	+55	0	+125	+70	+125	+85	0	+125	+95
+40	+30	1	+40	+40	+40	+55	1	+40	+70
0	+15	2	0	+30	0	+40	2	0	+55
-40	0	3	-40	+15	-40	+30	3	-40	+40
-85	0	4	-85	0	-85	+15	4	-85	+30
-100	-15	5	-125	0	-125	0	5	-125	+15
-100	-30	6	-155	-15	-165	0	6	-165	0
-100	-40	7	-155	-30	-210	-15	7	-210	0
-100	-55	8	-155	-40	-210	-30	8	-250	-15
-100	-70	9	-155	-55	-210	-40	9	-260	-30
-100	-95	More	-155	-85	-210	-70	More	-260	-55

TABLE 10

GOULD KS-5361 Lists 130-130A

A		DAYS	B		C		DAYS	D	
PRESENT CHG. RATE-AMPS.		PER	PRESENT CHG. RATE-AMPS.		PRESENT CHG. RATE-AMPS.		PER	PRESENT CHG. RATE-AMPS.	
0-.275		7	.276-.475		.476-.630		7	.631-.790	
0-.225		6	.226-.380		.381-.505		6	.506-.625	
0-.190		5 1/2	.191-.315		.316-.420		5 1/2	.421-.510	
0-.190		5	.191-.315		.316-.420		5	.421-.510	
REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE		REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE	
1 MO.	3 MO.	UNITS	1 MO.	3 MO.	1 MO.	3 MO.	UNITS	1 MO.	3 MO.
+100	+70	0	+155	+85	+155	+85	0	+155	+100
+50	+35	1	+50	+50	+50	+50	1	+50	+70
0	+15	2	0	+35	0	+35	2	0	+50
-50	0	3	-50	+15	-50	+15	3	-50	+35
-100	0	4	-100	0	-100	0	4	-100	+15
-100	-15	5	-155	0	-155	0	5	-155	0
-100	-35	6	-155	-15	-205	-15	6	-205	-15
-100	-50	7	-155	-35	-210	-35	7	-255	-35
-100	-70	8	-155	-50	-210	-50	8	-260	-50
-100	-85	9	-155	-70	-210	-70	9	-260	-70
-100	-100	10	-155	-85	-210	-85	10	-260	-85
-100	-100	More	-155	-120	-210	-120	More	-260	-120

TABLE 13

EXIDE & GOULD KS-5361 Lists 140, 140A, 141 & 141A

A		DAYS	B		C		DAYS	D	
PRESENT CHG. RATE-AMPS.		PER	PRESENT CHG. RATE-AMPS.		PRESENT CHG. RATE-AMPS.		PER	PRESENT CHG. RATE-AMPS.	
0-.460		7	.461-.790		.791-1.050		7	1.051-1.315	
0-.375		6	.376-.630		.631-.840		6	.841-1.045	
0-.320		5 1/2	.321-.530		.531-.700		5 1/2	.701-.860	
0-.320		5	.321-.530		.531-.700		5	.701-.860	
REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE		REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE	
1 MO.	3 MO.	UNITS	1 MO.	3 MO.	1 MO.	3 MO.	UNITS	1 MO.	3 MO.
+150	+100	0	+150	+115	+150	+130	0	+200	+150
+50	+65	1	+50	+85	+50	+100	1	+100	+115
0	+50	2	0	+65	0	+85	2	+50	+100
-50	+35	3	-50	+50	0	+65	3	0	+85
-100	+15	4	-100	+35	-50	+50	4	-50	+65
-150	0	5	-150	+15	-100	+35	5	-100	+50
-160	0	6	-200	0	-150	+15	6	-150	+35
-160	-15	7	-250	0	-200	0	7	-200	+15
-160	-35	8	-265	-15	-250	0	8	-250	0
-160	-50	9	-265	-35	-295	-15	9	-295	0
-160	-65	10	-265	-50	-345	-35	10	-345	-15
-160	-100	More	-265	-85	-350	-65	More	-430	-50

TABLE 17

EXIDE, GOULD or C&D KS-5361 Lists 150, 150A, 151 & 151A

A		DAYS	B		C		DAYS	D	
PRESENT CHG. RATE-AMPS.		PER	PRESENT CHG. RATE-AMPS.		PRESENT CHG. RATE-AMPS.		PER	PRESENT CHG. RATE-AMPS.	
0-.920		7	.921-1.575		1.576-2.100		7	2.101-2.630	
0-.750		6	.751-1.260		1.261-1.680		6	1.681-2.090	
0-.640		5 1/2	.641-1.055		1.056-1.400		5 1/2	1.401-1.720	
0-.640		5	.641-1.055		1.056-1.400		5	1.401-1.720	
REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE		REQUIRED MILS. CHANGE		WATER LOSS	REQUIRED MILS. CHANGE	
1 MO.	3 MO.	UNITS	1 MO.	3 MO.	1 MO.	3 MO.	UNITS	1 MO.	3 MO.
+270	+210	0	+270	+240	+360	+270	0	+360	+300
+90	+150	1	+90	+180	+180	+210	1	+180	+240
0	+120	2	0	+150	+90	+180	2	+90	+210
-90	+90	3	0	+120	0	+150	3	0	+180
-180	+60	4	-90	+90	-90	+120	4	-90	+150
-270	+30	5	-180	+60	-180	+90	5	-180	+120
-310	0	6	-270	+30	-270	+60	6	-270	+90
-310	0	7	-360	0	-360	+30	7	-360	+60
-310	-30	8	-450	0	-450	0	8	-450	+30
-310	-60	9	-520	-30	-540	0	9	-540	0
-310	-90	10	-520	-60	-630	-30	10	-630	-30
-310	-150	More	-520	-120	-700	-90	More	-810	-90