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LOG OF MEETING

DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: Meeting with representatives from ZLAN Ltd.

DATE OF MEETING: March 10, 1995

PLACE: CPSC offices at East West Towers, Bethesda, MD

LOG ENTRY SOURCE: Edward W. Krawiec

DATE OF ENTRY: March 13, 1995

COMMISSION ATTENDEES:

Aaron Banerjee, ESEE
Allen Brauninger, GCRA
Erlinda Edwards, ESEE
William H. King, Jr., ESEE
Rohit Khanna, ESME
Edward W. Krawiec, ESEE
Anna Luo, ESEE
Carolyn Meiers, EPHF
Dennis McCoskrie, ESEE
Mia Ngo, ESEE
Robert L. Northedge, ESEE
George Sweet, EPHF

NON COMMISSION ATTENDEES:

Vince Baelawski, National Electrical Manufacturers Association
Lee Blanton, ZLAN
Karl Davenport, ZLAN
George Spencer, ZLAN

SUMMARY OF MEETING: A copy of the meeting agenda is appended to this Meeting Log. Mr. Spencer introduced himself and Messrs. Blanton and Davenport to the attendees and then gave a brief overview of ZLAN Ltd. He emphasized ZLAN's goal of bringing new approaches made possible by high-speed microcircuitry to the objective of reducing the number of fires attributed to electrical system malfunctions.

Mr. Spencer noted that, according to Fire Administration data, 1 in 5 fires in this country are attributed to electrical malfunctions. Mr. Spencer believes that a significant number of those fires could have been prevented if overcurrent protective devices -- primarily circuit breakers -- were better able to detect and respond to anomalies in our electrical systems. He pointed out that the basic design of conventional thermal/magnetic circuit breakers is over 50 years old and remains essentially unchanged over those years. He noted the electrical industry's insistence on defining the role of conventional overcurrent protective devices as one of merely protecting the wiring itself from overheating.

Rather than debate the logic of the industry position, Mr. Spencer has tried to focus attention on the possibility of dramatically improving the responsiveness of thermal/magnetic breakers to all electrical system anomalies by adding another sensing element in parallel with the thermal and magnetic trip elements as they currently exist. This approach is analogous to that of the introduction of Ground Fault Circuit Interrupter (GFCI) technology to conventional thermal/magnetic circuit breakers over 20 years ago. The GFCI sensing element operates in parallel with the conventional thermal and magnetic trip elements to detect and respond to an entirely different type and range of electrical anomaly. The GFCI sensing element thereby enhances the capability of a circuit breaker and expands its role beyond the mere protection of the wires from overheating. Mr. Spencer believes that ZLAN's "Circuit Overload Protection" (COP) sensing technology could similarly enhance the capability of a conventional circuit breaker and expand its role to providing true responsiveness to potentially dangerous overcurrent conditions.

Mr. Spencer described the COP concept as providing extremely high-speed monitoring of the actual current flow through the electrical system. In contrast, both the conventional thermal and magnetic trip elements respond to an indirect effect of current flowing through specially designed parts of those trip elements. Since they respond to an effect of current flow, such sensing schemes are inherently slow responding and subject to external influences. By programming the COP circuitry to accept certain well defined "overcurrent" conditions as acceptable, the COP can be set to respond almost instantly to both very low levels and very fast changing overcurrents. The ability to provide some level of "intelligence" to the COP function would permit it to respond to a vast range of potentially dangerous conditions now outside the capability of a conventional circuit breaker to detect while minimizing "nuisance tripping" of the COP breaker.

Mr. Spencer noted that the single greatest impediment to providing dramatically improved overcurrent protection to our electrical systems is the total absence of electrical equipment design constraints which would limit "in-rush" or starting-current transients. Most electrically powered utilization equipment (motors, lighting, electronic equipment, etc.) draw a current very much higher than their normal or running current for at least a few electrical cycles when they are first turned-on. For example, a 60 watt bulb will draw a nominal 1/2 amp after it is lit but can draw over 10 times that amount of current -- 5 amps or more -- when first turned-on (depending upon the type of bulb and its construction details). Mr. Spencer's point is that high-speed microcircuitry makes it a trivial problem to sense and respond to rapidly changing overcurrent conditions but that the designs of electrical utilization equipment unnecessarily complicate the problem by producing "normal" short-term overcurrent conditions which are not easily distinguished from potentially dangerous conditions. Mr. Spencer sees a need for a massive but sharply focused effort by industry, academia, and government to study the issue of "normal" transient overcurrent conditions. The objectives of such an effort would be to develop standards governing permissible levels of such transient conditions and to develop "soft-start" technology which would minimize if not eliminate transient conditions. It would then be feasible to develop enhanced COP type protective schemes which could further reduce the incidence of electrically caused fires.

Mr. Spencer "guesstimated" that such an effort might require a budget of fifty million dollars a year over a ten year period. He noted that the cost may seem large but that it is only a fraction of the life, injury, and property loss costs associated with electrically caused fires.

Messrs. Spencer, Davenport, and Blanton then provided demonstrations of the ZLAN "Current Rating Verification" apparatus and COP equipped circuit breakers. Copies of two sets of data supporting ZLAN's positions were provided to the attendees. The data sets are entitled, Short Circuit Current vs Circuit Breaker Trip Time Test Data and House Test Data - Test Data Taken with a ZLAN Current Rating Verification Meter. Copies of these data sets are appended to this Meeting Log.

ZLAN Ltd
1615 West Brown Street
Wylie, Texas

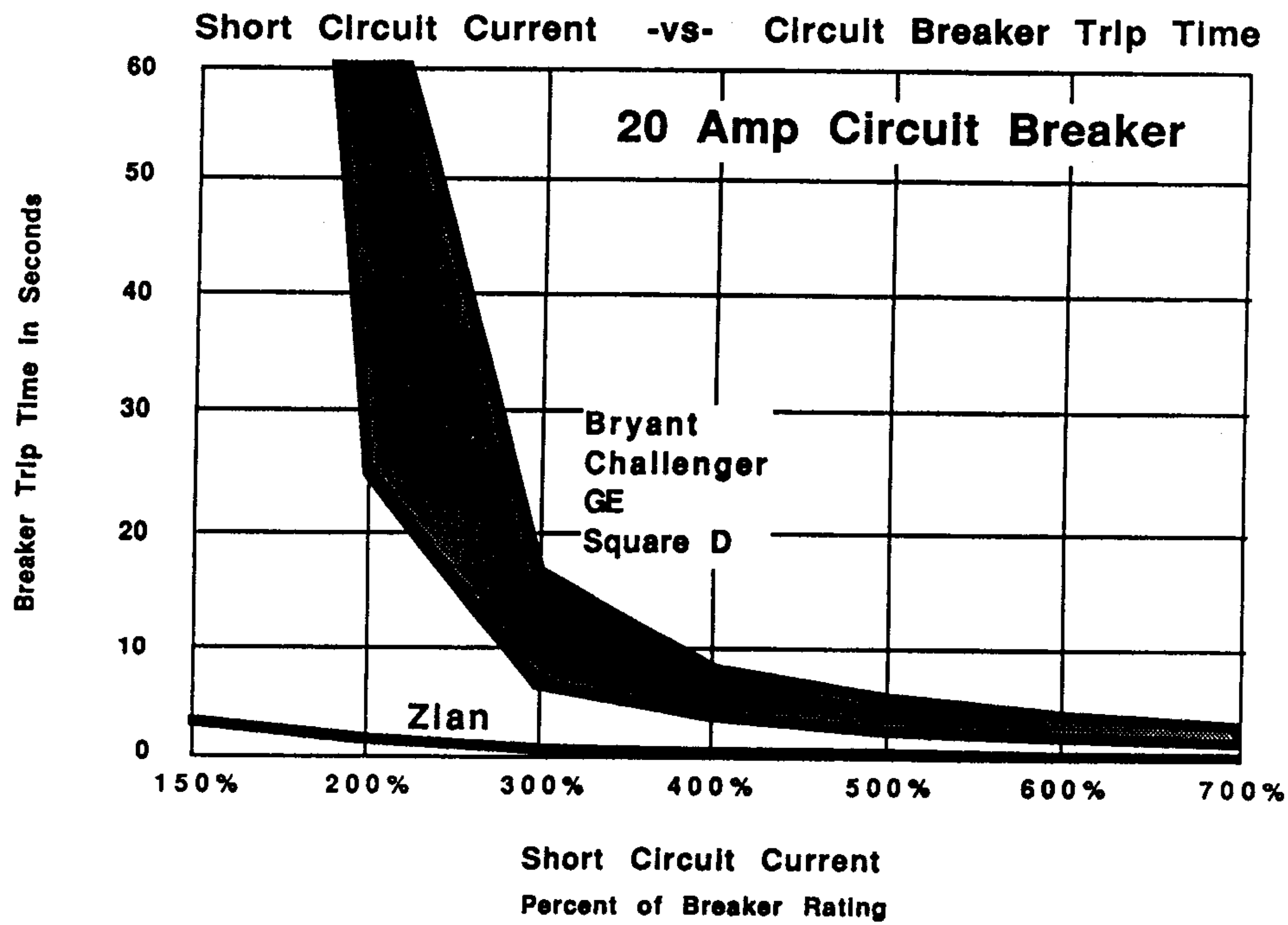
INTRODUCTION OF COP TECHNOLOGY
(Agenda for One-Half Day Program)

9:30 am	I.	INTRODUCTION/OVERVIEW (Computer-Slide Presentation) • Introduction of Zlan Team • Zlan's Mission • The Problem • The Root Cause • The Solution	Karl Davenport V-P Sales
10:15	II.	THE CRV-2 TESTER • Introduction - Development • Demonstration - Effects of Wire Length on Electrical Shorts.	George Spencer President - CEO
10:45		Break Period	
11:00	III.	CONCEPT REVIEW/DISCUSSION (Summary of COP and CRV-2)	Karl Davenport
11:05	IV.	CIRCUIT BREAKER DEMONSTRATION • Mechanics of Today's Circuit Breaker. • Computer Simulation: Circuit breaker in Typical Home Conditions. • Trip Time versus Short Circuit Current/Wire Length. • Computer Simulation: Standard and Zlan's Circuit Breakers. • Demonstration: Standard and Zlan's Circuit Breakers. • Demonstration: Effect of Overload Condition on Extension cords.	Lee Blanton V-P Engineering
11:45	V.	CONCEPT REVIEW/DISCUSSION (Summary of Application of COP Technology)	George Spencer
12:00	VI.	CONCLUSIONS/CLOSING COMMENTS	George Spencer

Short Circuit Current
- vs -
Circuit Breaker Trip Time

Test Data

Test data taken with a
Zlan Circuit Breaker Tester


Short Circuit Current -vs- Circuit Breaker Trip Time
20 Amp Circuit Breaker
Breaker Trip Time in Seconds
60
50
40
30
20
10
0
Bryant
Challenger
GE
Square D
Zian
150%
200%
300%
400%
500%
600%
700%
Short Circuit Current
Percent of Breaker Rating

CIRCUIT BREAKER RESPONCE TIME -vs- SHORT CIRCUIT LOAD CURRENT

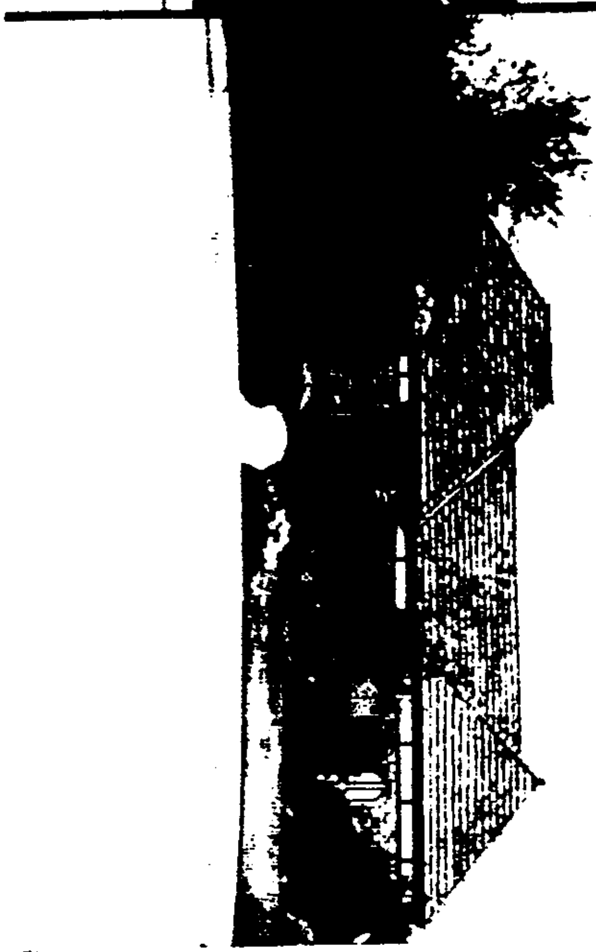
Load Current	20 Amp Circuit Breaker Responce Time					
	ZLAN	SQ_D	BRYANT	GE	CHALLENGER	
30 A 150%	327 2.725	26,744 222.867	50,947 424.558	36,198 301.650	No Trip No Trip	1/2 cyc Seconds
40 A 200%	112 0.933	3,070 25.583	7,471 62.258	5,637 46.975	8,631 71.925	1/2 cyc Seconds
60 A 300%	46 0.383	780 6.500	1,282 10.683	1,334 11.117	1,979 16.492	1/2 cyc Seconds
80 A 400%	28 0.233	427 3.558	549 4.575	693 5.775	926 7.717	1/2 cyc Seconds
100 A 500%	10 0.083	238 1.983	291 2.425	397 3.308	593 4.942	1/2 cyc Seconds
120 A 600%	6 0.050	190 1.583	226 1.883	310 2.583	447 3.725	1/2 cyc Seconds
140 A 700%	3 0.025					1/2 cyc Seconds

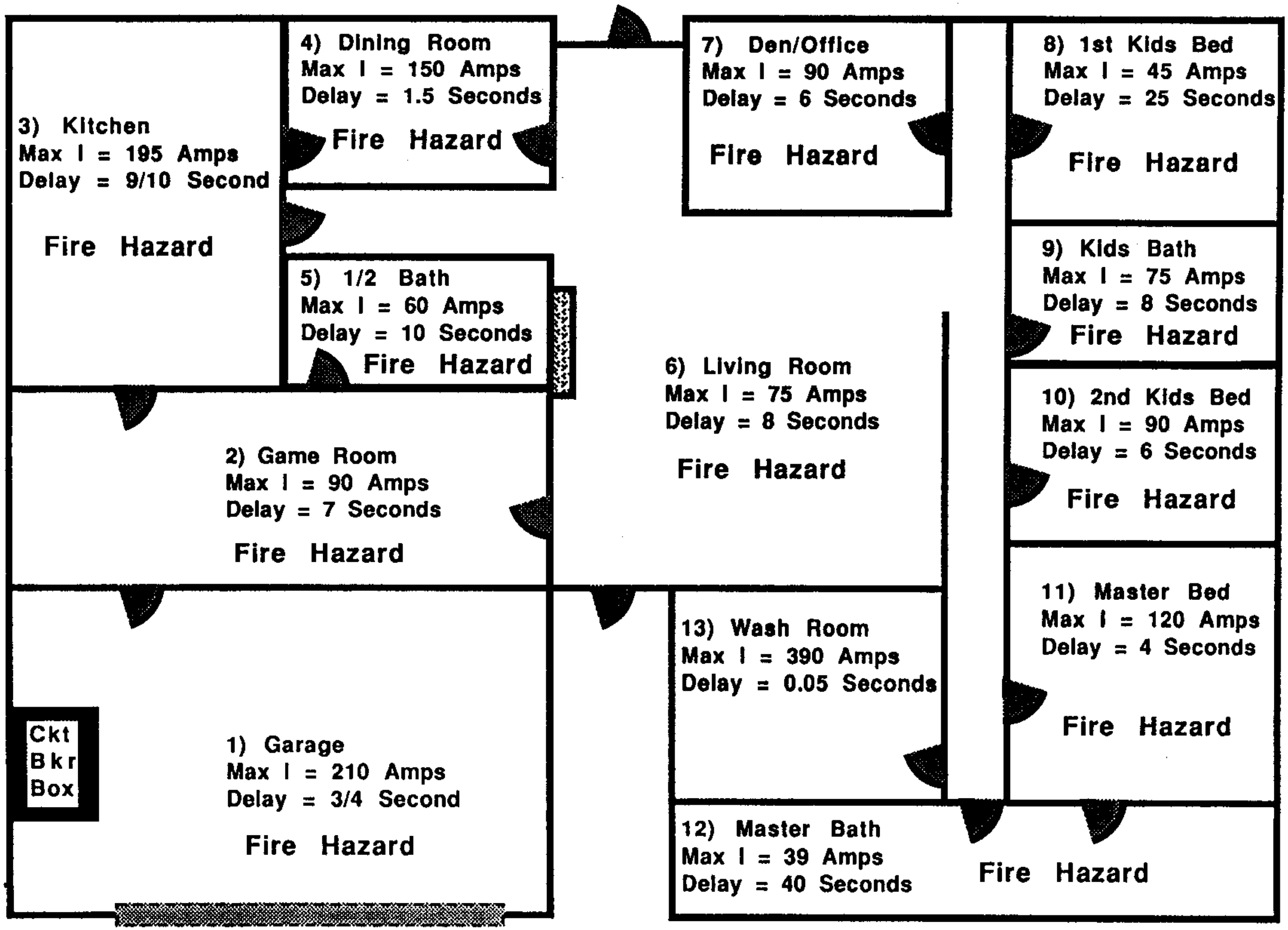
House Test Data

Location..: North Dallas Tex
Mfg Date..: Early 1980's
Price........: $250,000
Wiring......: Copper

Test data taken with a Zlan Current Rating Verification Meter

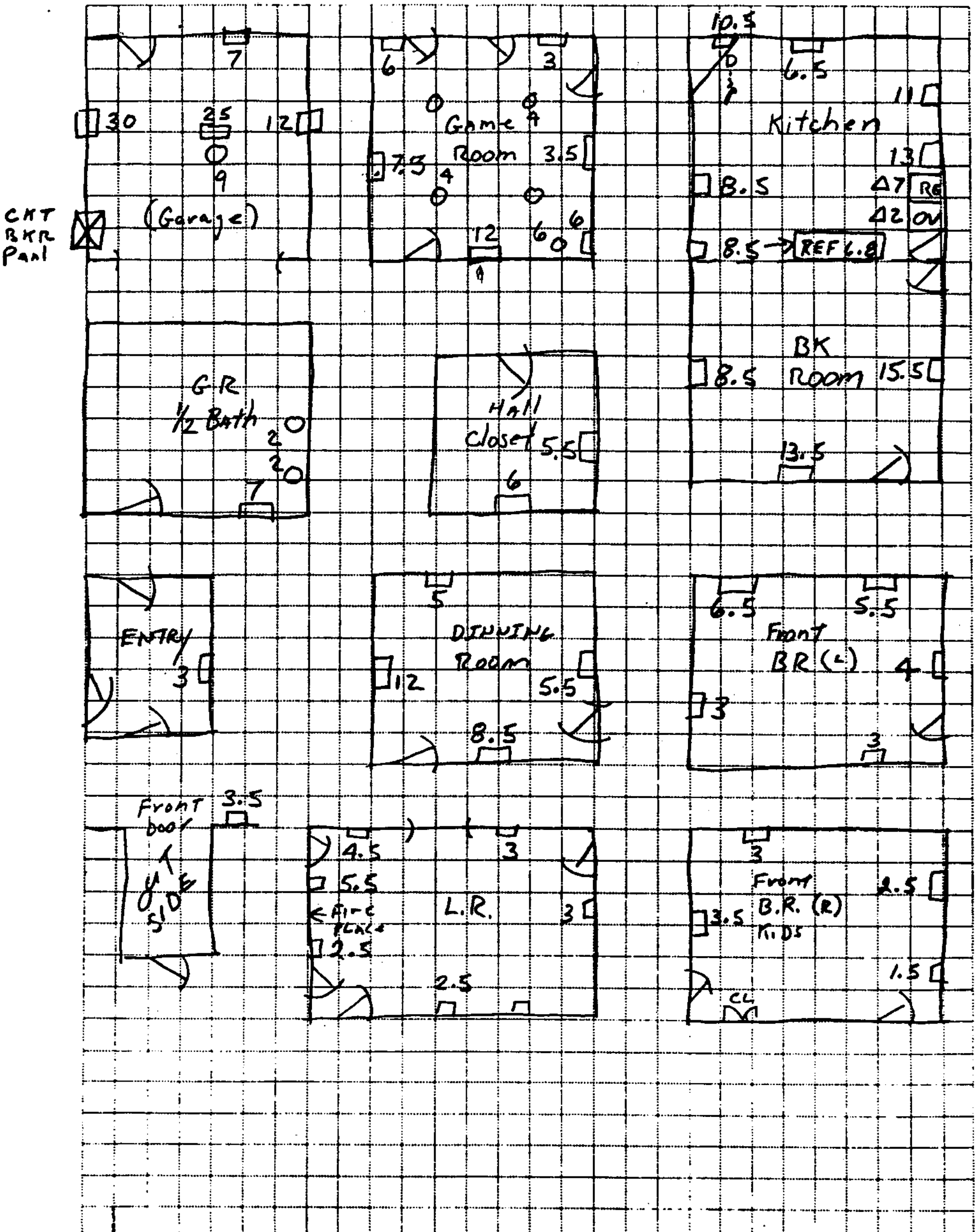




Max I = Maximum Short Circuit Current (should wiring short out).
Delay = Delay before Circuit Breaker Trips (should wiring short out).

Figure 1 (Case_1)


CKT BKR Panl
(Garage)
Game Room
Kitchen
REF
GR 1/2 Bath
Hall Closet
BK Room
ENTRY
DINNING Room
Front BR (L)
Front Door
Side
L.R.
Fire place
Front B.R. (R) Kids
CL

Insp# 830305-1GS