TEST EQUIPMENT LIST

DEVICE	MODEL	SERIAL
Signal Generator	HP 8644A	2933A00424
Spectrum Analyzer	HP 8566B	2847A04964
Display		2816A15853
Quasi-Peak Adapter	HP 85650A	2524A00802
Amplifier	HP 8447D	2443A03986
Dipole Set	CD “Robert’s” Set	351
Horn Antenna	Emco 3115	2268
Coax (100’)	Belden 8214	N/A
Amplifier	HP8449B	3008A00576

All above equipment verified to be within manufactures specifications Sept 15,1999.

Site Description

Located at 22790 Lake Park Blvd. Alliance, Ohio. A complete description of the site is on file with the FCC.

B8Q WKF99
TECHNICAL REPORT

MANUFACTURER

The Genie Company / GMI Holdings Inc.
22790 Lake Park Blvd.
Alliance, Ohio 44601

MULTIPLE LISTINGS OF TRANSMITTERS

The Genie Company conducts business under the following trade names:

The Genie Company
The Alliance Manufacturing Company
GMI Professional Access Systems
Overhead Door Corporation

MODEL	TRADE NAME
GWKIC-BL	GMI Professional Access Systems
GWKIC-12	GMI Professional Access Systems
OWK-CD	Overhead Door Corporation

EXPOSITORY STATEMENT

TRANSMITTER DESCRIPTION

The transmitter is a keypad garage door entry system for use with receivers designed by The Genie Company / GMI Holdings Inc., a wholly owned subsidiary of Overhead Door Corporation. The transmitter data transmission is a fixed code 10 and 20 Khz data stream with a 50% duty cycle that is decoded by the receiver. Tables are included to detail data structure.

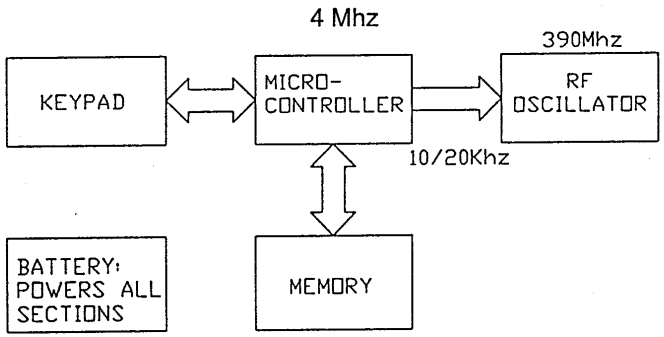
The circuit consists of the following:

- keypad
- micro-controller with resonator controlled oscillator at 4 MHz
- encoder
- RF oscillator (antenna is integral part of the oscillator tank circuit)
- 9 volt battery

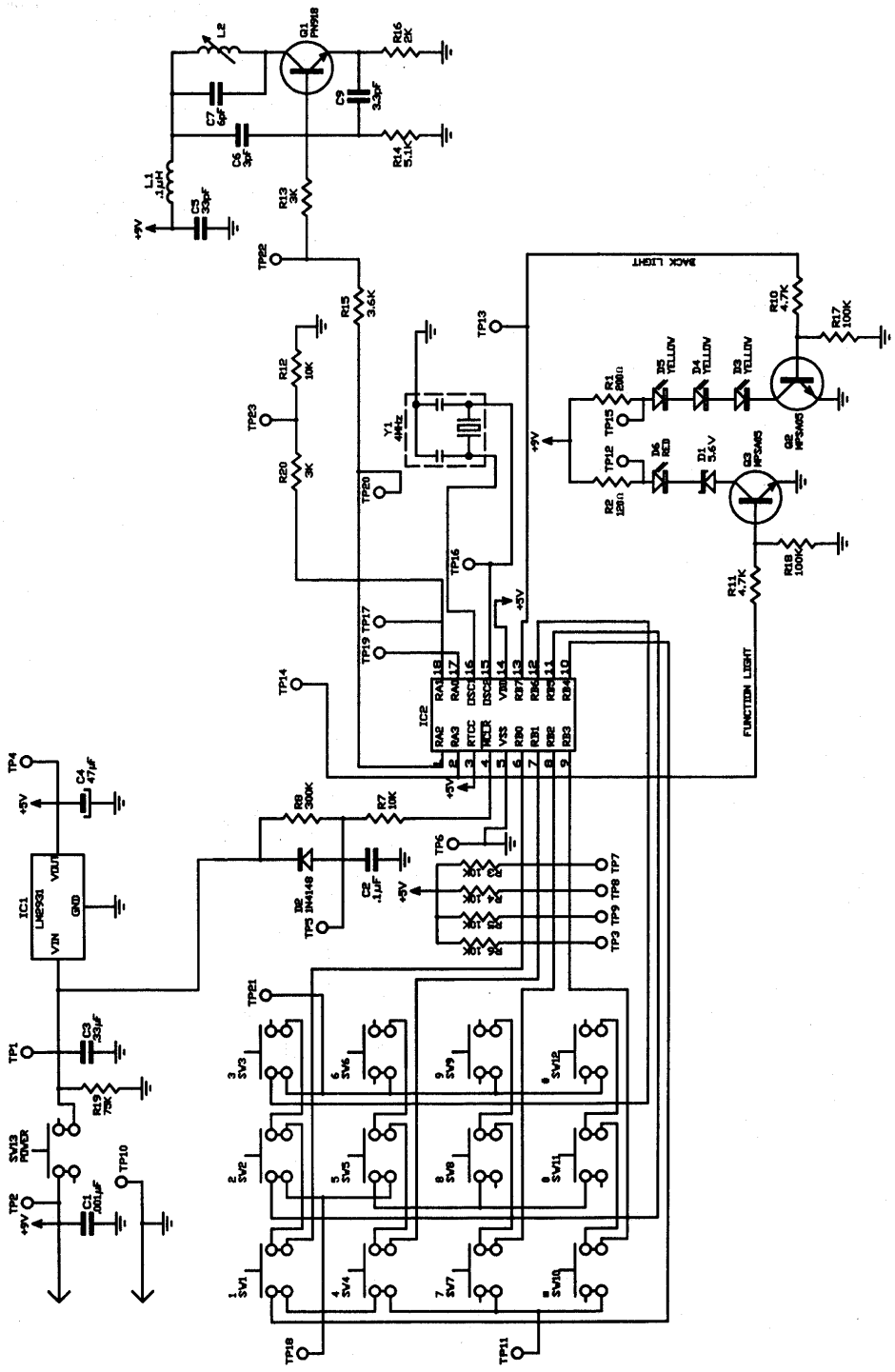
When the user enters the proper code sequence, the encoder modulates an RF carrier which is tuned to a frequency of 390 MHz. See the accompanying schematic and block diagrams.

The back of the transmitter has a label with the required FCC text, along with the FCC identifier, B8Q WKF99, and the model number. An accompanying drawing example detailing the label is provided. The position of the label is shown in the accompanying photograph.

B8Q WKF99



BLOCK DIAGRAM


L2
Q1
PN918
R16
2K
C7
6pF
C9
3.3pF
C6
3pF
R14
5.1K
L1
1µH
C5
33pF
+5V
R13
3K
TP22
R15
3.6K
TP13
BACK LIGHT
R10
4.7K
R17
100K
R12
10K
TP23
Y1
4MHz
R20
3K
TP20
R1
680Ω
D5
YELLOW
D4
YELLOW
D3
YELLOW
TP15
+5V
Q2
MPSA65
TP12
D6
RED
D1
5.6V
Q3
MPSA65
R2
120Ω
R18
100K
R11
4.7K
TP16
TP17
TP19
+5V
IC2
RA2
RA3
RTCC
MCLR
VSS
RB0
RB1
RB2
RB3
RA4
RA5
OSC1
OSC2
VDD
RB7
RB6
RB5
RB4
TP14
FUNCTION LIGHT
TP4
+5V
C4
47µF
IC1
LM2931
VOUT
VIN
GND
R9
300K
R7
10K
TP6
D2
1N4148
TP5
C2
.1µF
+5V
TP7
TP8
TP9
TP3
TP21
TP1
C3
33µF
R19
75K
SW3
POWER
TP2
+5V
C1
.001µF
TP10
SW1
SW2
SW3
SW4
SW5
SW6
SW7
SW8
SW9
SW10
SW11
SW12
TP18
TP11

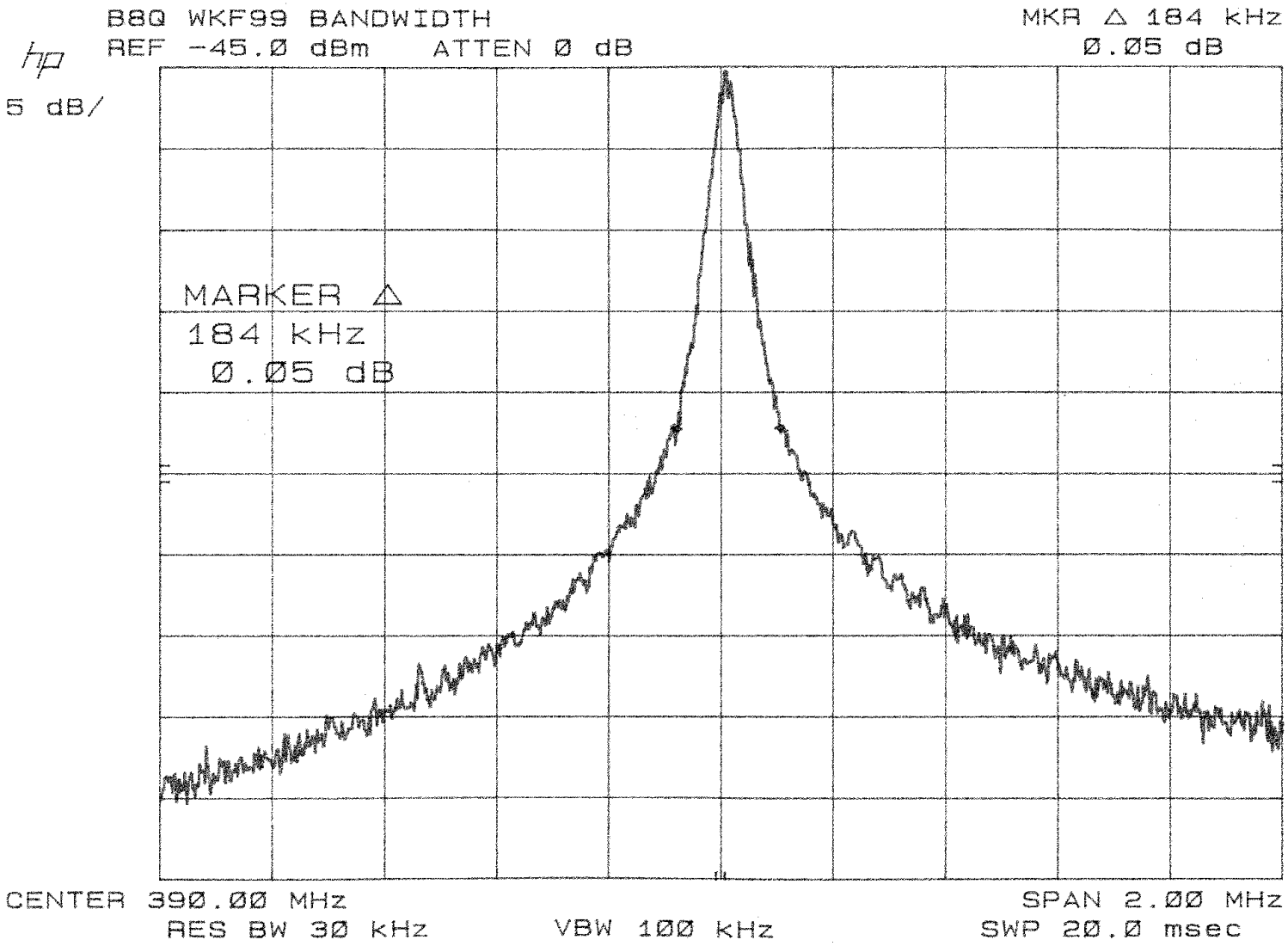
CERTIFICATION MEASUREMENTS
OF
B8Q WKF99 DOOR OPERATOR TRANSMITTER

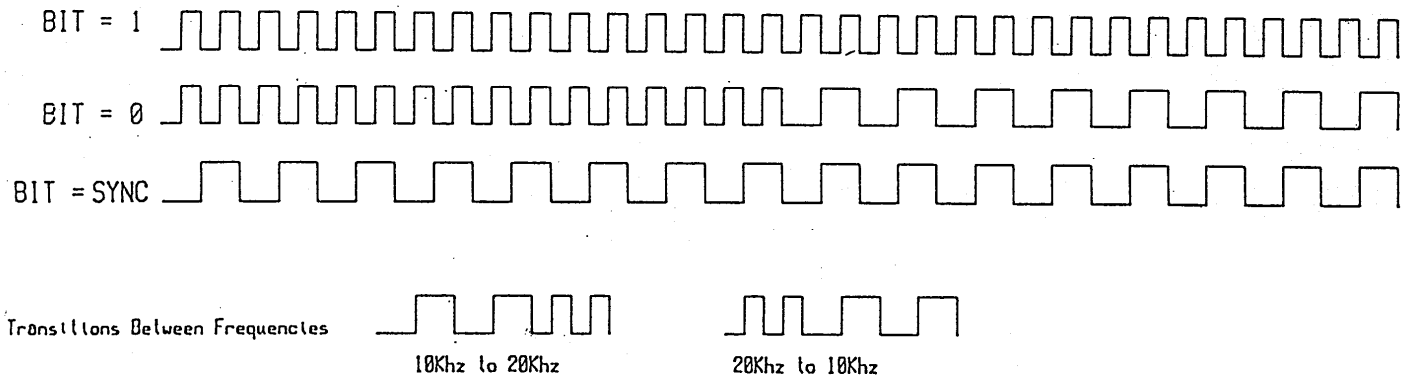
PREPARED BY:

L.Chop Kramer
Engineering Technician
THE GENIE COMPANY
22790 Lake Park Blvd.
Alliance, Ohio 44601

B8Q WKF99

Scan /Div Mhz	Res. Bandwidth Khz	DUT Frequency (Mhz)	Meter Frequency (Mhz)	Meter Reading (dBm)	Antenna Factor (dB)	Coax Factor (dB)	Amplifier Gain (dB)	Measurement Distance (Meters)	Duty Cycle Correction (dB)	3 Meter Limit (uV/M)	Field Strength (uV/M)	Delta Limit (dB)
0.5	100	390	390	-21.6	20.8	4.2	26.78	3	-6	10083	7,603.26	-2.45
0.5	100	390	780	-66.9	25.9	6.3	25.48	3	-6	1008	109.90	-19.25
0.5	1000	390	1170	-55.6	25.4	8	35.14	3	-6	500	152.41	-10.32
0.5	1000	390	1560	-52.1	27.3	9.6	34.79	3	-6	500	355.22	-2.97
0.5	1000	390	1950	-61.7	29.2	10.9	34.44	3	-6	1008	177.01	-15.11
0.5	1000	390	2340	-65	29.4	12.1	35.4	3	-6	1008	127.35	-17.97
0.5	1000	390	2730	-65	30.6	13.4	35.5	3	-6	500	167.88	-9.48
0.5	1000	390	3120	-65	31.6	14.5	36.6	3	-6	1008	188.36	-14.57
0.5	1000	390	3510	-65	33.1	15.5	35.6	3	-6	500	281.84	-4.98
0.5	1000	390	3900	-65	34.7	16.5	35.3	3	-6	500	393.55	-2.08


B8Q WKF99 BANDWIDTH
REF -45.Ø dBm
ATTEN Ø dB
MKR Δ 184 kHz
Ø.Ø5 dB
5 dB/
MARKER Δ
184 kHz
Ø.Ø5 dB
CENTER 390.ØØ MHz
RES BW 3Ø kHz
VBW 1ØØ kHz
SPAN 2.ØØ MHz
SWP 2Ø.Ø msec



DATA WORD STRUCTURE

Figure 1.

DATA WORD STRUCTURE

The data word format consists of a series of digital pulses. Referring to Figure 1, a binary '1' consists of 32 pulses at 20 kilohertz. A binary '0' consists of 16 pulses at 20 kilohertz followed by 8 pulses at 10 kilohertz. A 'sync' bit precedes the data word and consists of 16 pulses at a frequency of 10 kilohertz. A duty cycle of 50% is achieved throughout the entire data word transmission. The transition between frequencies is also shown at the bottom of Figure 1.

For compatibility with door openers that utilize a 9 position dip switch to set the door code, the transmitted data word is 16 bits long and is formatted as shown below:

SYNC 11110 XXX XXX XXX 1

The Xs would be the binary representation of the three bit octal code set to match the associated door opener's code setting.

For compatibility with door openers that utilize a 12 position dip switch to set the door code, the transmitted data word is also 16 bits long and is formatted as shown below:

SYNC 10 XXX XXX XXX XXX 1

Again the Xs would be the binary representation of the three bit octal code set to match the associated door openers code setting.

Once the transmission is initiated, the data word will be continuously repeated as long as the customer continues to press the appropriate button(s). The transition between data words maintains a format as depicted in Figure 1, "Transitions Between Frequencies".

NOTES ON RADIATED EMISSIONS

B8Q WKF99

Sept 15,1999

1) The reported meter readings are the highest levels observed of six positions of the DUT and the antenna for each frequency.

2) The Measurements up to 1Ghz were taken using the HP8447D amplifier. The measurements above 1Gnhz were taken using the HP 8449B amplifier.

3) The reading of -65 dBm is the lowest measurement possible with the equipment available. This level is below the allowed limit in each case.

4) Sample calculation: $uV/m = 10^{(107 + M + AF + CF - G - DC) / 20}$

M = -28.0
AF = 2.0 uV/m = 316
CF = 2.0
G = 27.0
DC = 9.0

5) The actual duty cycle is a function of the transmitted code. The transmitted data has a worst case duty cycle of 50%. This gives the -6dB correction factor in the above equation and in the Radiated Emissions calculations. Using the data times shown in the expository, the correction factor calculation is as follows:

correction = 20 * log (25usec/50usec) = -6 dB

6) The transmitters were modified to allow continuous transmission.

7) The transmitter was surveyed for emissions resulting from the local oscillators. No measurable emissions were present.

8) A chart of the data word structure is included figure 1.

9) All measurements were made using ANSI 63.4-1992.