These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to General Electric Company.
INSTRUCTIONS

MULTIPLIER/DIVIDER, 193X541A_G01–G04

1.0 GENERAL

This instruction provides basic information regarding the subject card. Refer to the system elementary diagrams for information relating to the overall system operation.

2.0 DESCRIPTION

The card contains either one or two integrated circuit multiplier chips with the following group arrangements:

G01 and G03 one channel
G02 and G04 two channels

The G01 and G03, and the G02 and G04 are both mechanically and functionally interchangeable. Different groups for the equivalent functions identify use of different electronic devices.

PERFORMANCE

The card will have the following characteristics while exposed to the conditions indicated:

2.1 Multiplication

With ±20V and COM applied to tabs 31, 2 and 15 respectively, and with Z connected to OP (Z1 to OPl for G01, Z1 to OPl and 22 to OP2 for G02), the card will generate an output voltage.

\[ \text{OP} = 0.1 \times X \times Y \] where X and Y are voltages applied to the respective inputs.

2.11 Accuracy – (multiplication)

Total error (25°C): \( \pm 0.27\% \) max. of \( \pm 0.027\% \) max. with a 10K ohm or less output load.

(All accuracy is % of 10V full output)

Total error vs. temp.: \( \pm 0.01\%\/\degree C \) or \( 0.001V/\degree C \).

Warm-up time to rated performance: 5 minutes

2.12 Individual errors (contributing to the total errors in 2.11)

Output offset: \( \pm 0.015V \) max at 25°C with \( X = Y = 0 \)

Scale factor: \( \pm 0.1\% \text{ or } 0.01V \text{ at } 25\degree C \)

Feedthrough: \( X = 0, Y = 20V \text{ p–p, } 10Hz - 0.02V \text{ p–p} \)

\( Y = 0, X = 20V \text{ p–p, } 10Hz - 0.02V \text{ p–p} \)

Non-linearity: \( X(Y) = \pm 10V, Y(X) = 20V \text{ p–p} \)

\( \pm 1\% \text{ or } \pm 0.01V \)

2.2 Division

With ±20V and COM applied to tabs 31, 2 and 15 respectively and with Y connected to OP, the card will generate an output voltage.

\[ \text{OP} = 10 \times Z/X \] where the applied voltages X and Z are within the following ranges:

\[ -10V \leq X \leq -0.1V \]

\[ -10V \leq Z \leq +10V \]

2.21 Accuracy – Division

Total divider error: \( 10 \times E_m/X \) where \( E_m \) is the total error previously specified for the multiplier operation.

NOTE: A 10.1 denominator (X) range is a practical limit for the dividing mode.

2.3 Output

Max. output voltage: ± 10V

Max. output current: ± 5mA

Output Impedance: 1 Ohm

2.4 Input

Max. rated input voltage: ± 10V

Max. safe input voltage: ± 15V

Input impedance, X, Y, (X): 25K ohms, (70K ohm)

2.5 Temperature

Rated performance: 0 to 70°C

Max Operating: -25°C to +85°C

2.6 Power Supply

Range: ±15V ±0.15V at tab 26, -15V ±0.15V at tab 8

Quiescent current: +15mA, -8.5mA at ±15V and +31mA, -25mA at ±20V

Drift: 0.02% per °C

3.0 ADJUSTMENTS

There are no adjustments on this card.

4.0 TROUBLESHOOTING

4.1 Check for +15 ± 1 volts at tab 26, -15 ± 1 volts at tab 8.
4.2 As a multiplier:
With +20 volts, −20 volts and Com applied to tabs 31, 2 and 15 respectively and with Z connected to OP (Z1 to OP1 for G01, Z1 to OP1 and Z2 to OP2 for G02), apply 10 volts to either X1 and Y1 or X2 and Y2. Card output for this condition should be 10 volts ±0.27% at OP1 or OP2 respectively.

If the output does not fall within this value, the card should be replaced.

4.3 As a divider:
With +20 volts, −20 volts, and Com applied to tabs 31, 2 and 15 respectively and with Y connected to OP (Y1 to OP1 for G01, Y1 to OP1 and Y2 to OP2 for G02), apply −10 volts to either Z1 and X1 or Z2 and X2. Card output for this condition should be 10 volts ±0.27% at OP1 or OP2 respectively.

If the output does not fall within this value, the card should be replaced.

4.4 Use an oscilloscope to determine if excessive noise on any of the input signals causes a distortion of the output signal during system operation. Filtering of the input signal(s) may be necessary to improve operation.
UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING:

APPLIED PRACTICES

SURFACES

TOLERANCES OR NOMINAL DIMENSIONS

GENERAL ELECTRIC

36B590243AD

TITLE: ELEMENTARY DIAGRAM

MULTIPLIER CARD

FIRST MADE FOR STANDARD LINE

195X641AD301 & 30E

NOTES:

1. MULTIPLIER

OP = X/Y WITH Z CONNECTED TO OP.

2. MULTIPLIER/DIVIDER 435J CAN BE

USED INSTEAD OF 4206K.

3. IC CHIP POINTS RUN

DIRECTLY TO TABS BUT

ARE NOT SHOWN ON E.L.M.
NOTES:

1. MULTIPLIER OF \(-M\) WITH \(Z\) CONNECTED TO OP.

IC CHIP POINTS RUN DIRECTLY TO TABS BUT ARE NOT SHOWN ON ELEM.
HOLE TABULATION

ALL HOLES 0.032 IN. EXCEPT THE HOLES TABULATED BELOW

LOC. DIA. QUAN.
A 0.037 2
B 0.040 32
C 0.052 38

NOTES
1. INDICATED TAB NUMBERS CORRESPOND TO MATCHING RECEPTACLE NUMBERS.
2. CROSS HATCHED TABS INDICATES TABS USED.
3. CARD SIZE: 5.500 X 3.130.
4. THIS CARD HAS GOLD PLATED TABS ON BOTH SIDES. TABS 1 THRU 32 ARE LOCATED ON THE REVERSE SIDE. TABS 33 THRU 64 ARE LOCATED ON THE COMPONENT SIDE OF THE CARD. TAB 1 IS OPPOSITE TAB 32 AND, ETC. THE TAB NUMBERS SHOWN ARE THOSE USED ON THIS CARD.

(TOP VIEW)

SKETCH FOR MD-1, MD-2

(TOP VIEW)

SKETCH FOR Ti

SKETCH FOR T2