

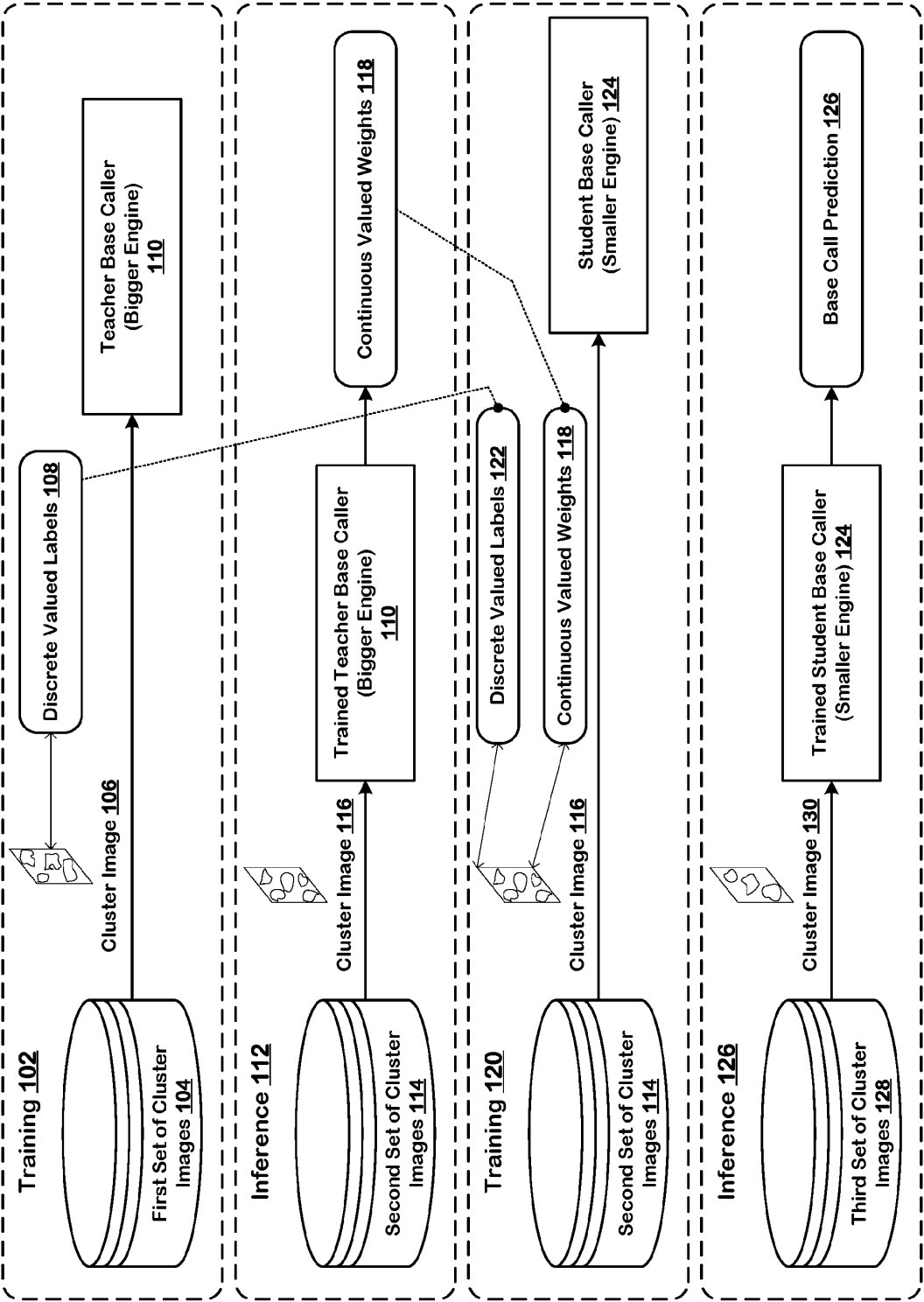


FIG. 1

Training the Teacher Base Caller (Bigger Engine) 200A

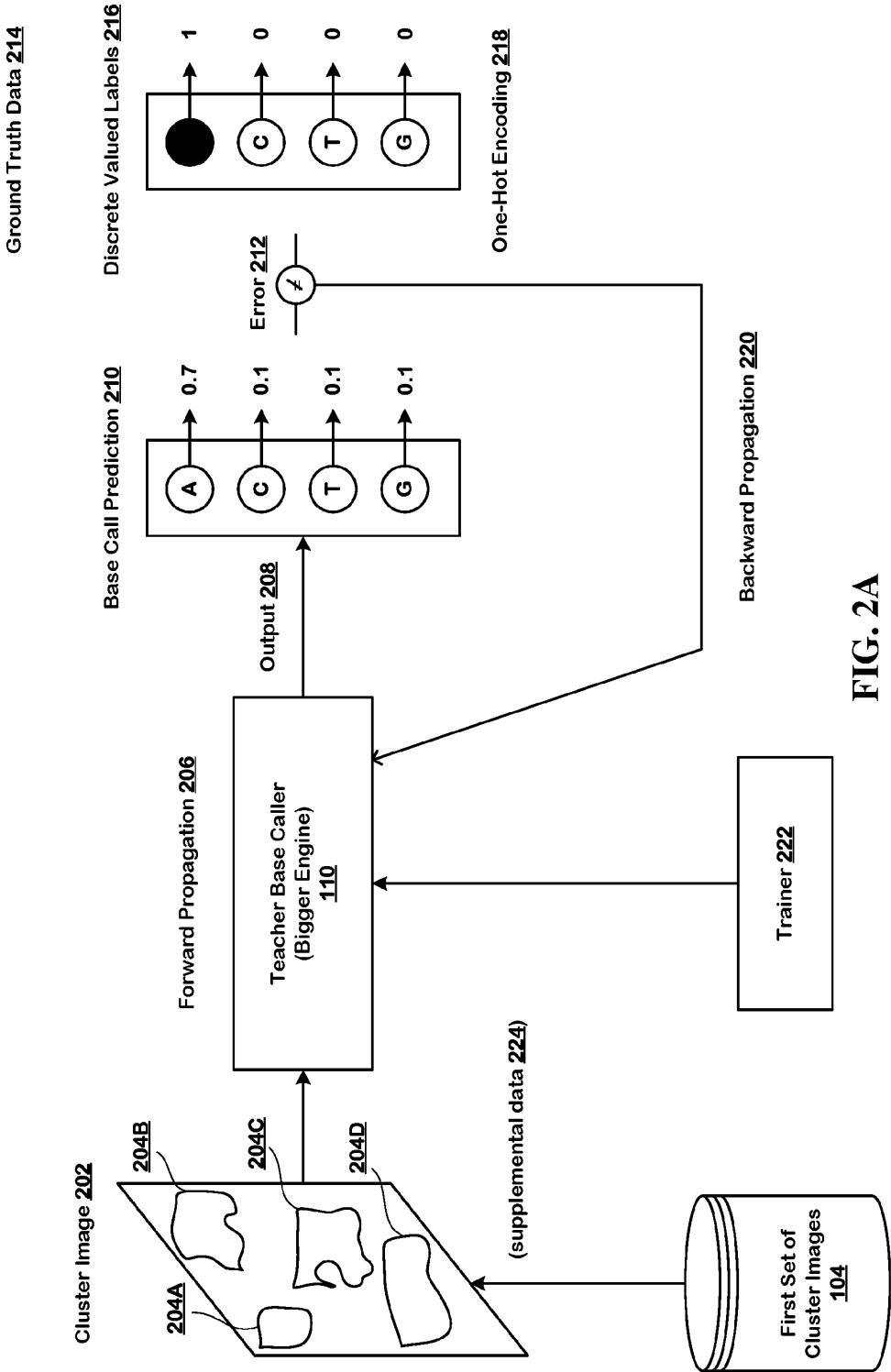


FIG. 2A

Training the Teacher Base Caller (Bigger Engine) 200B

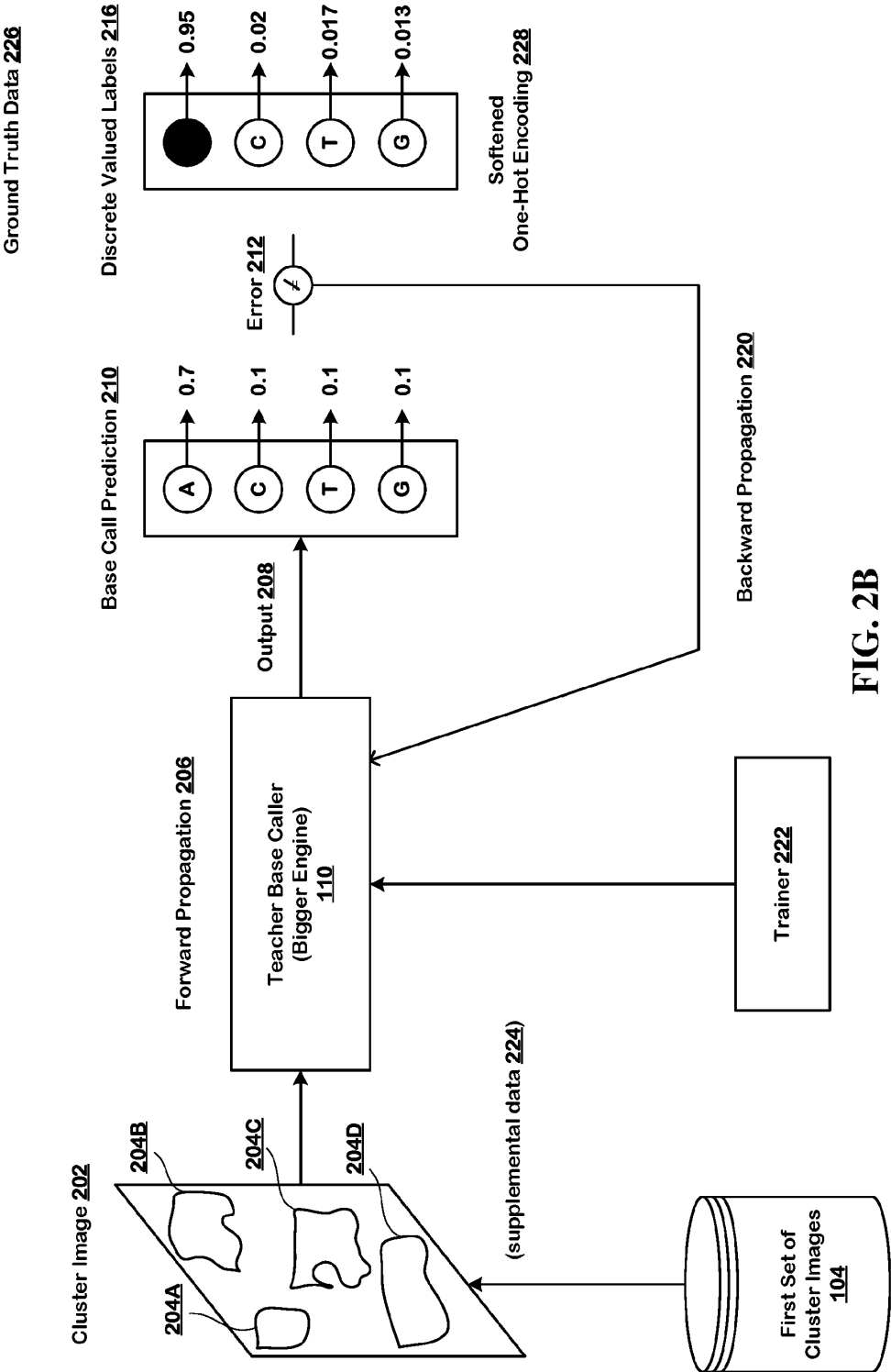


FIG. 2B

Inference with the Teacher Base Caller (Bigger Engine) 300

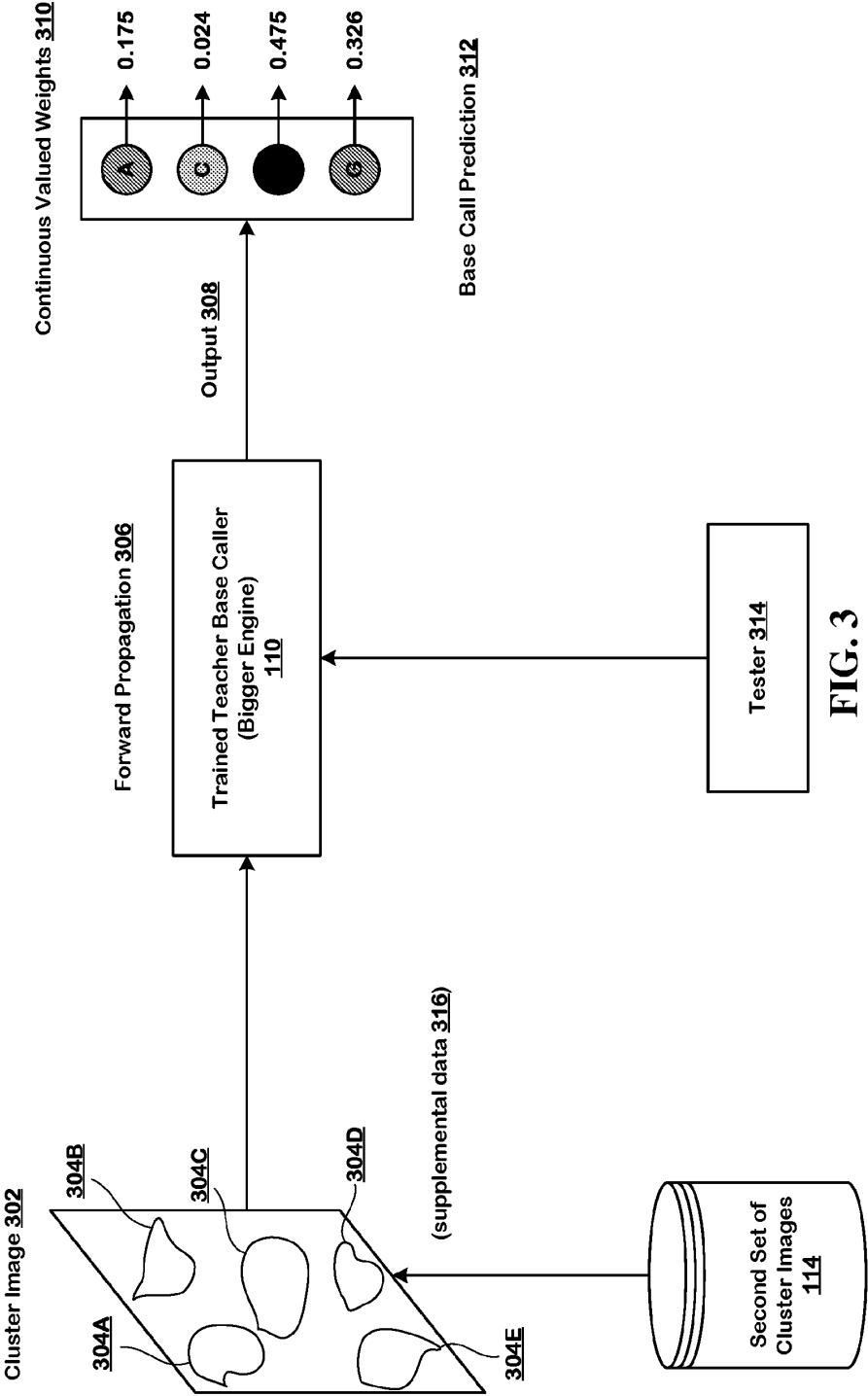


FIG. 3

Hybrid Ground Truth Data Generation 400A

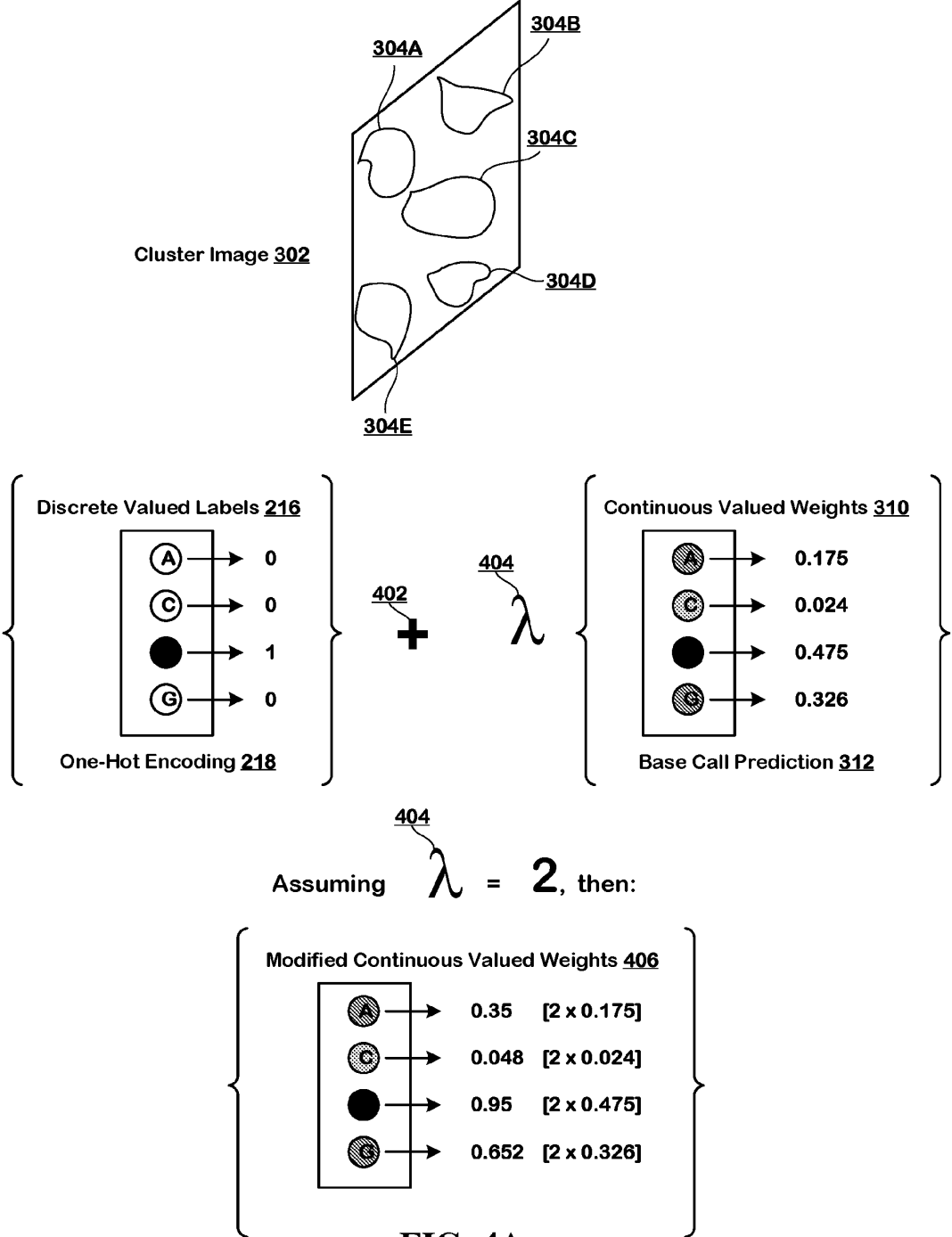
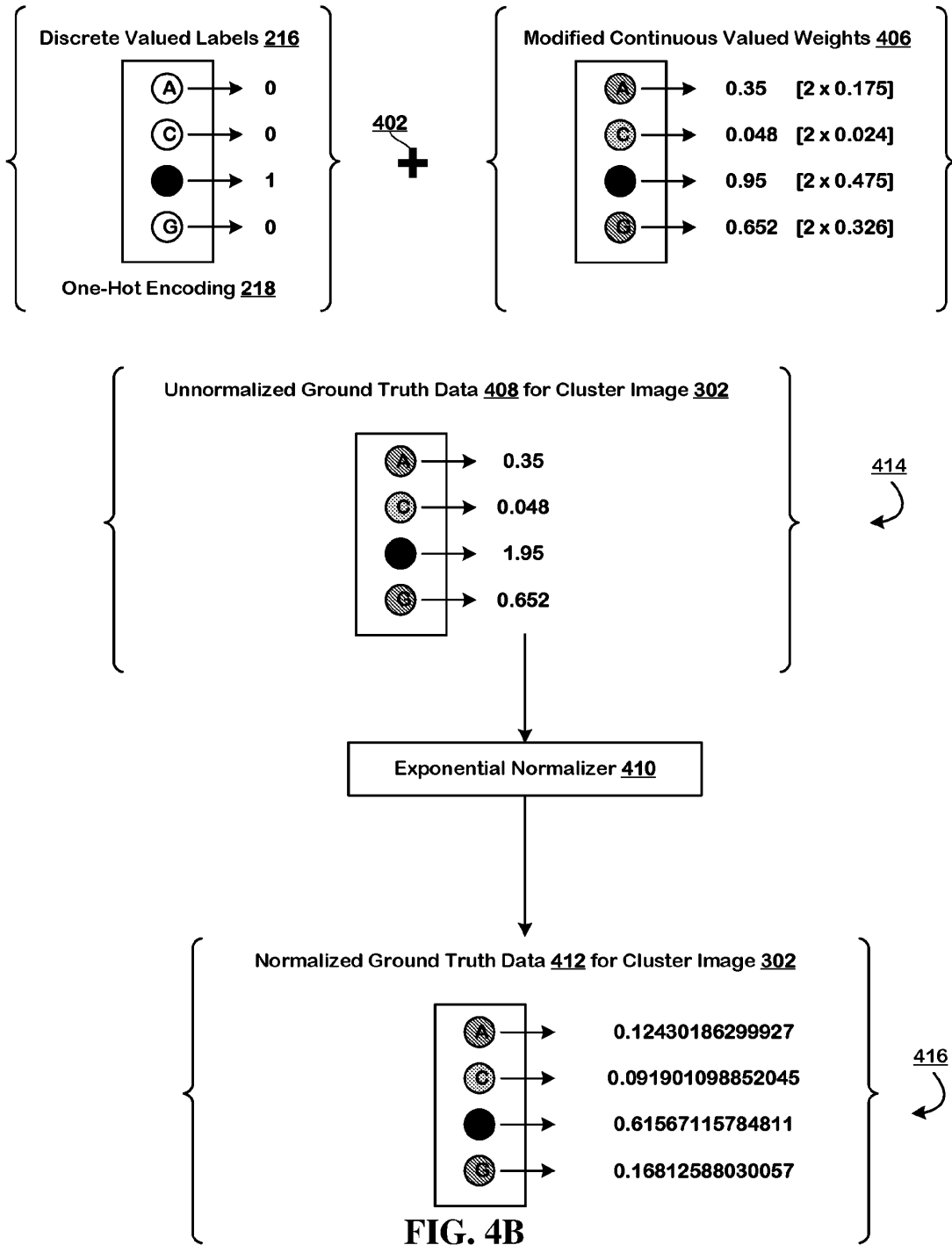


FIG. 4A

Hybrid Ground Truth Data Generation **400B**



Training the Student Base Caller (Smaller Engine) 500

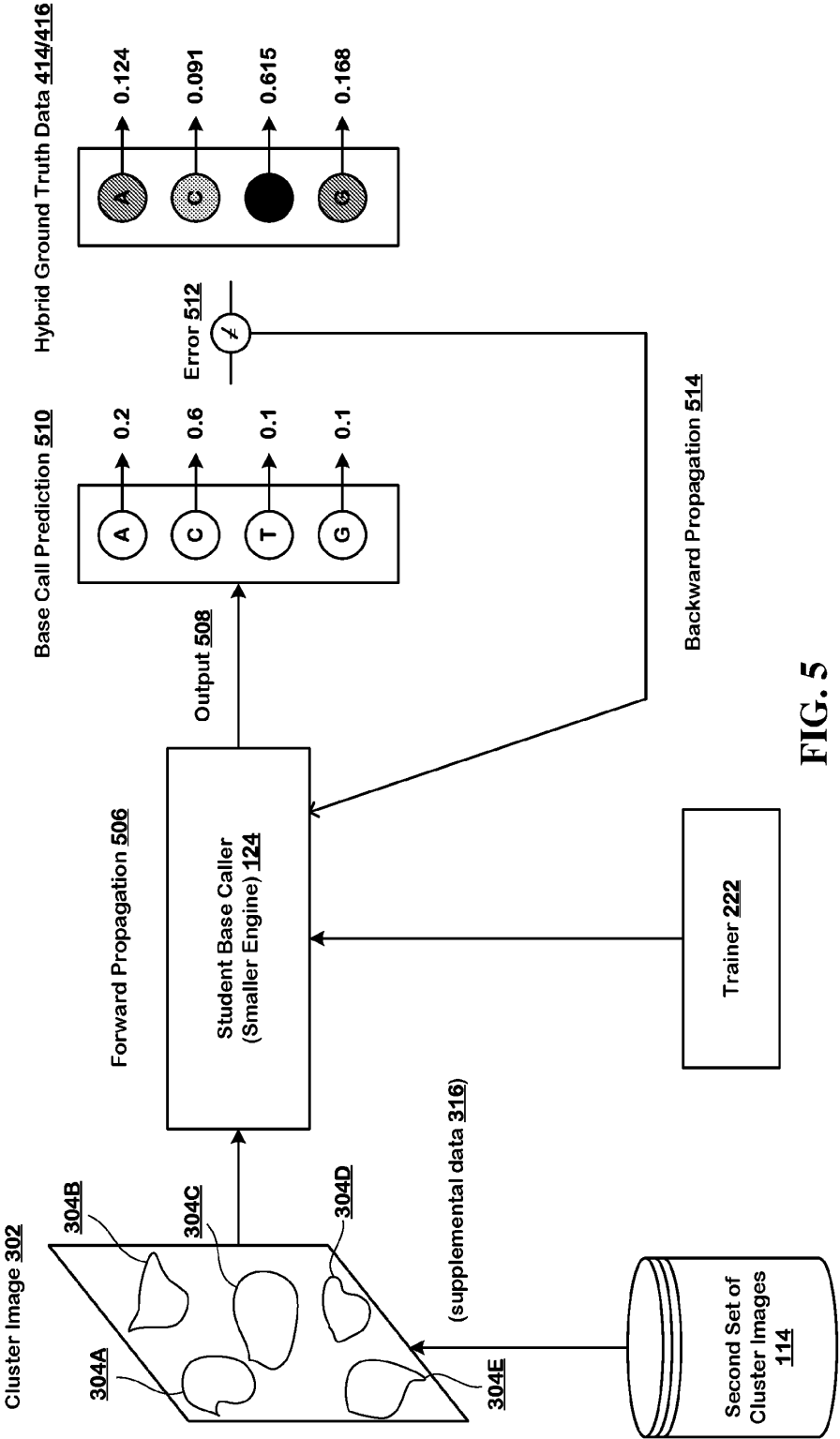


FIG. 5

Inference with the Student Base Caller (Smaller Engine) 600

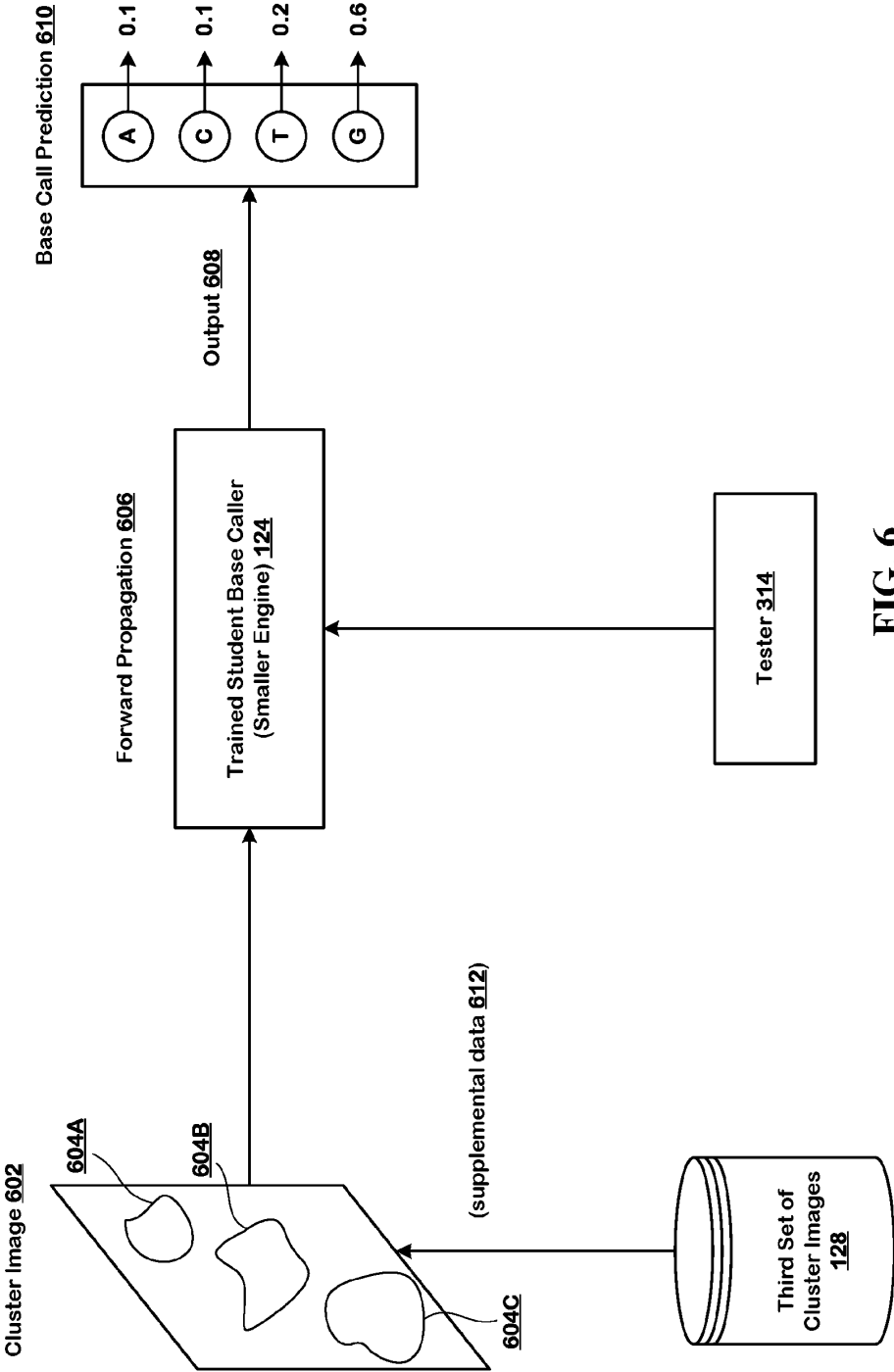


FIG. 6

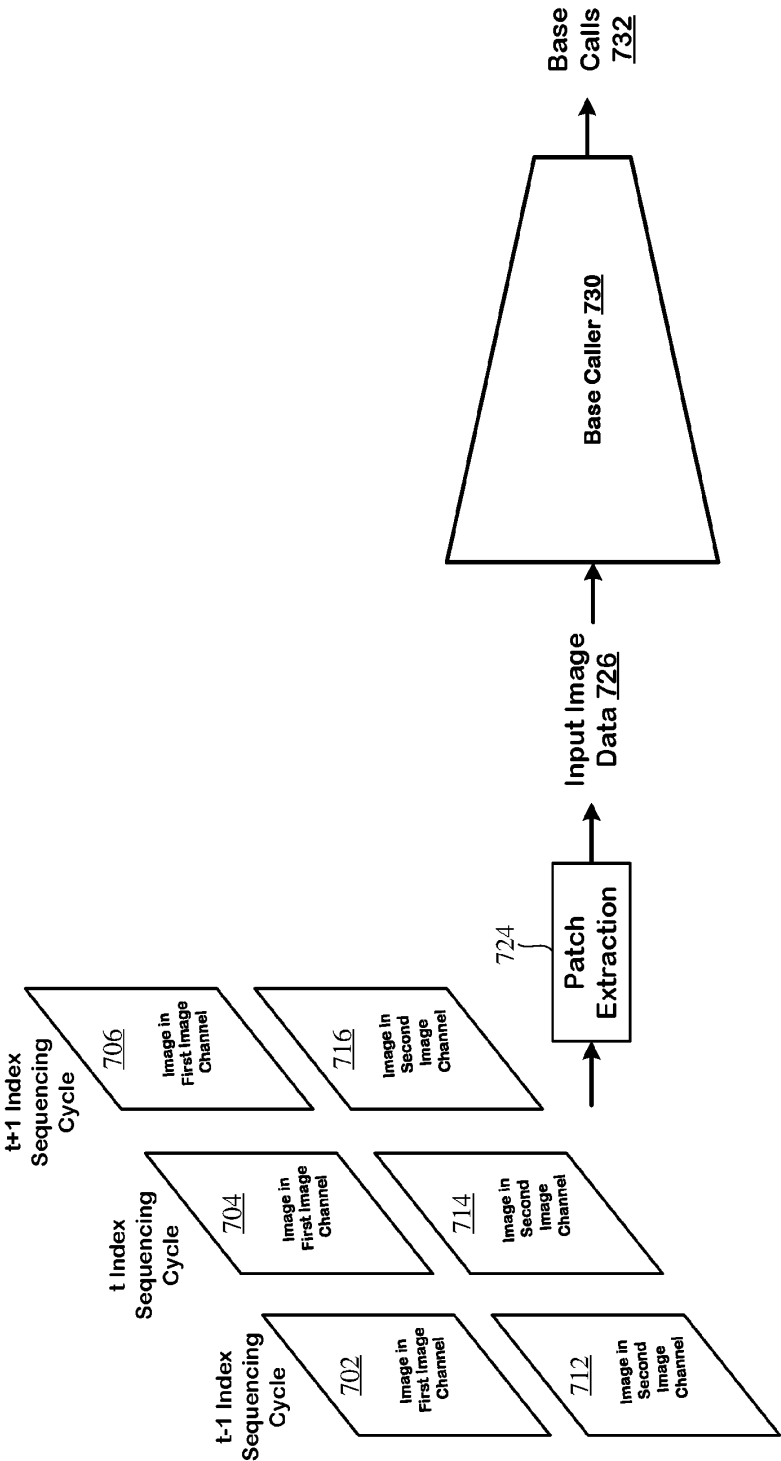


FIG. 7

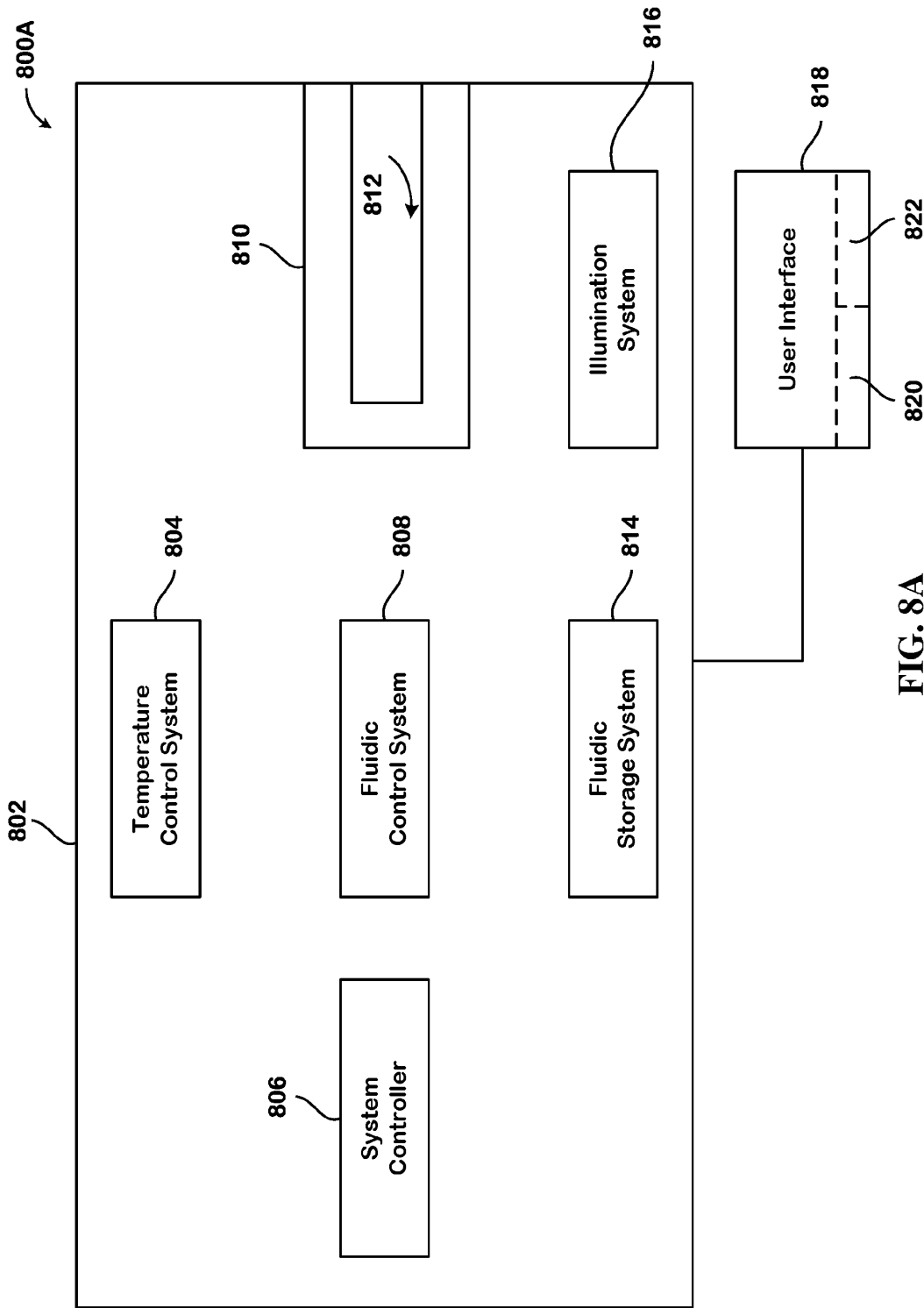


FIG. 8A

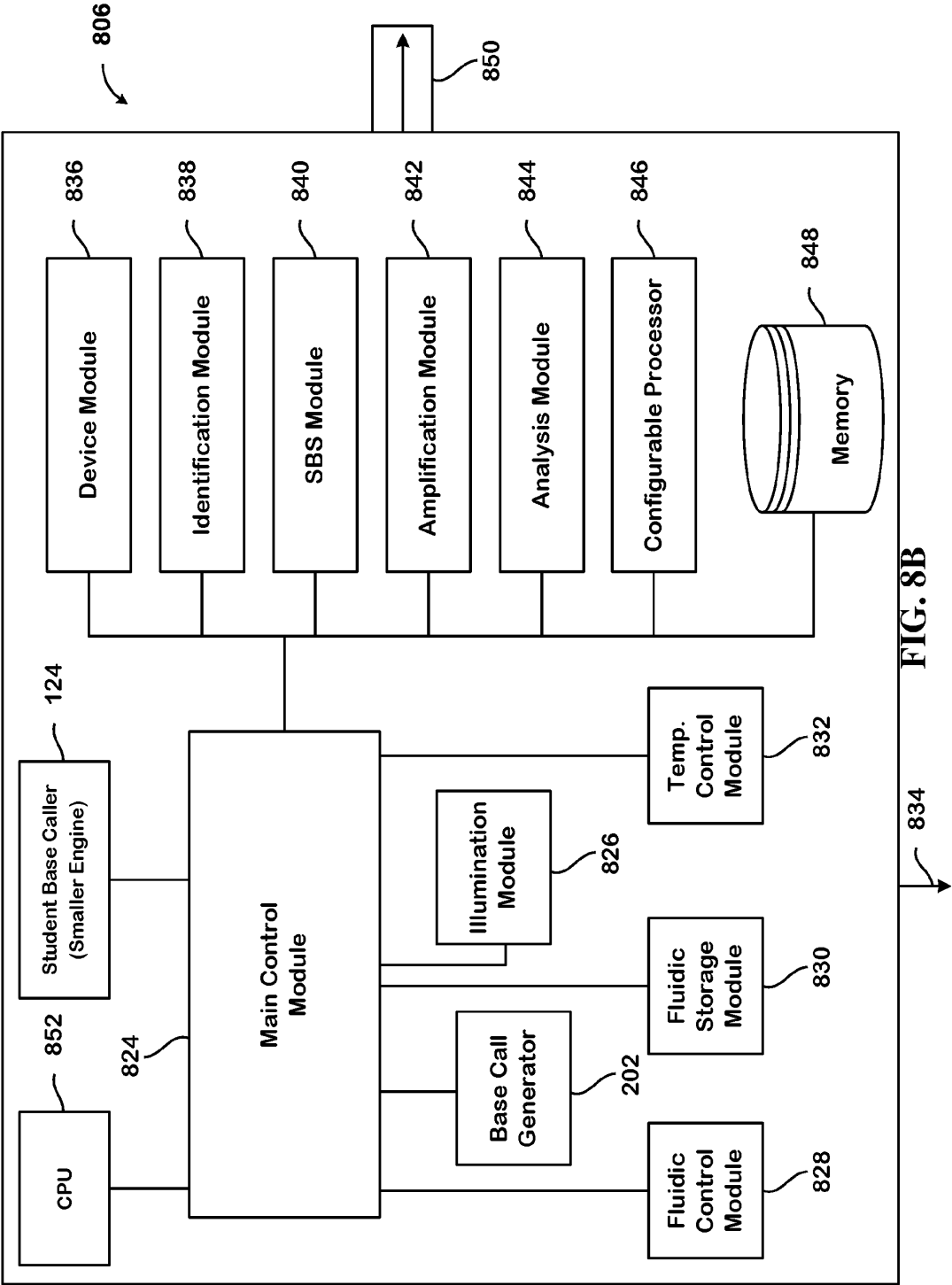
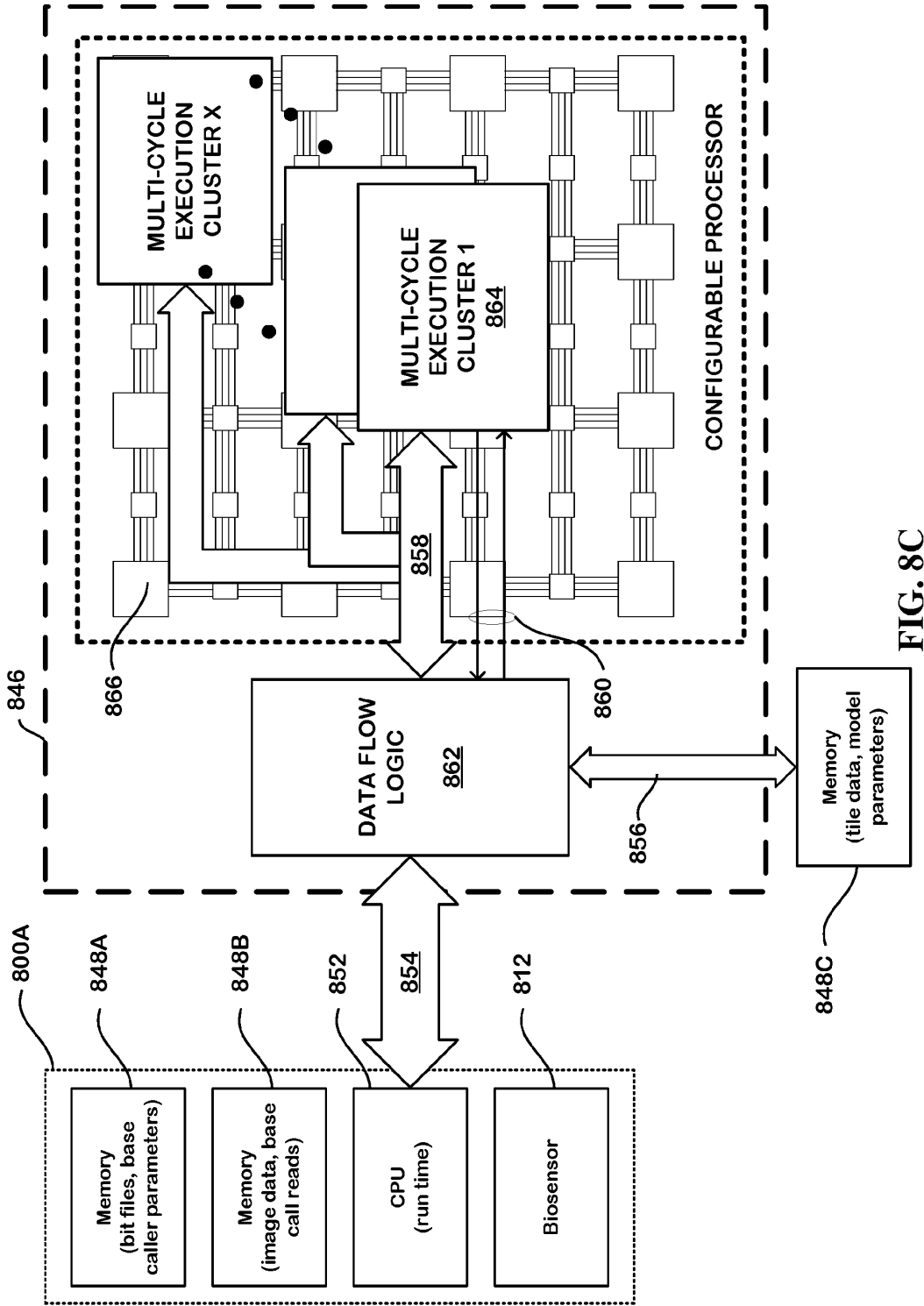


FIG. 8B



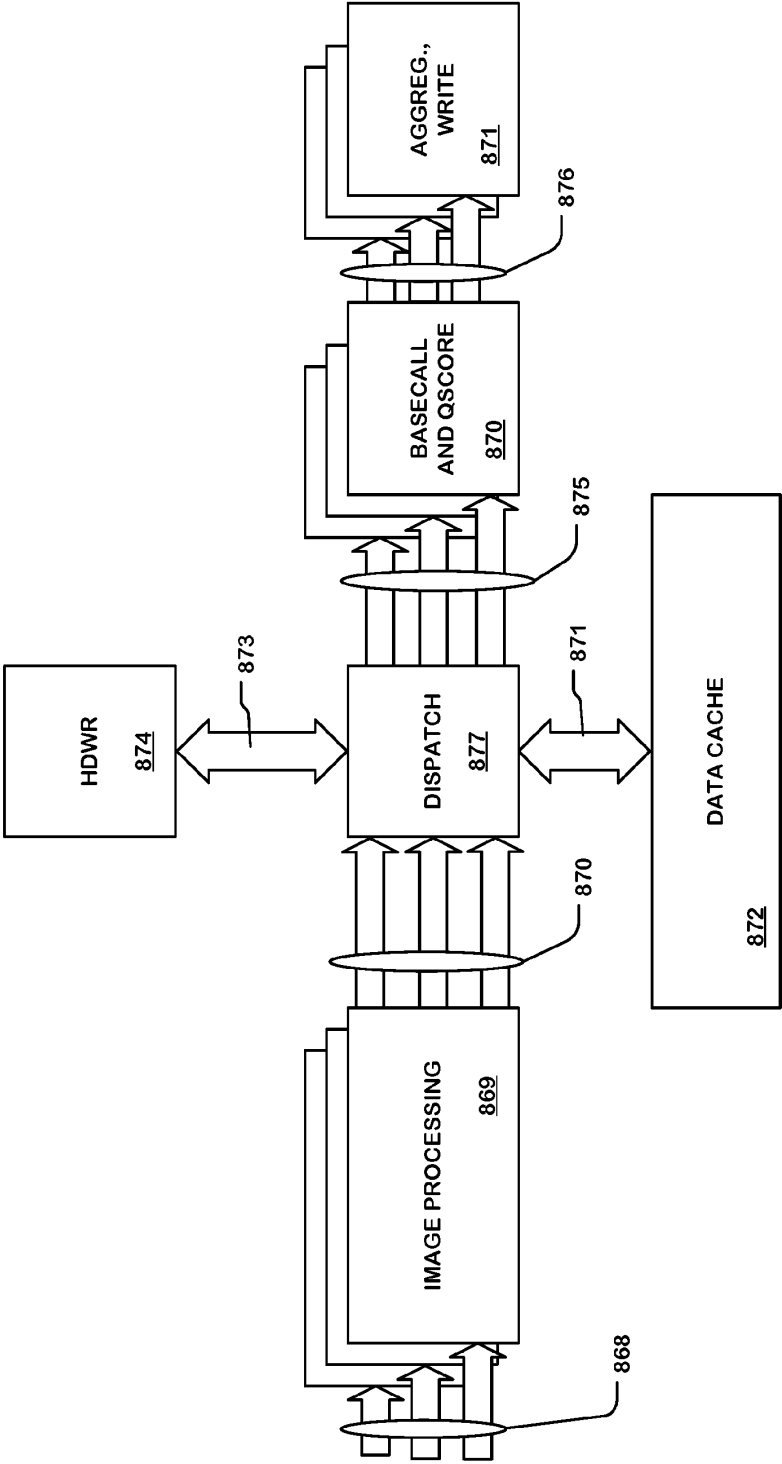


FIG. 8D

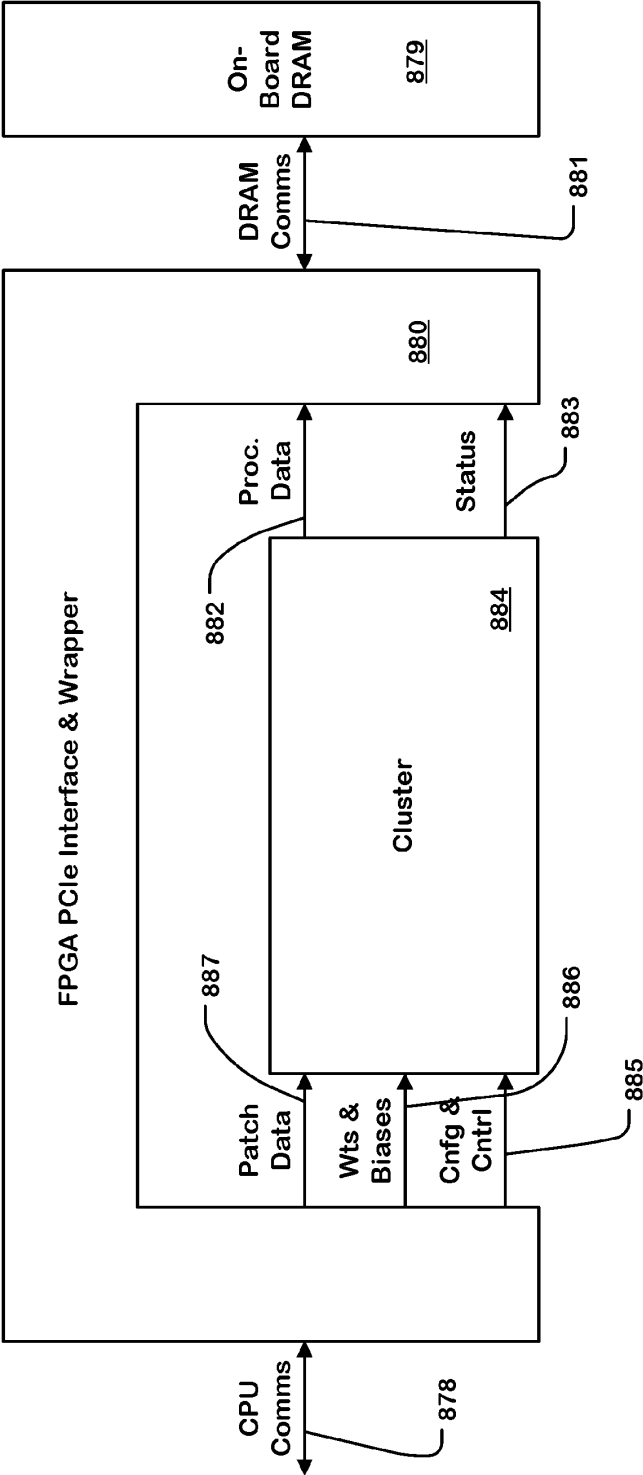


FIG. 8E

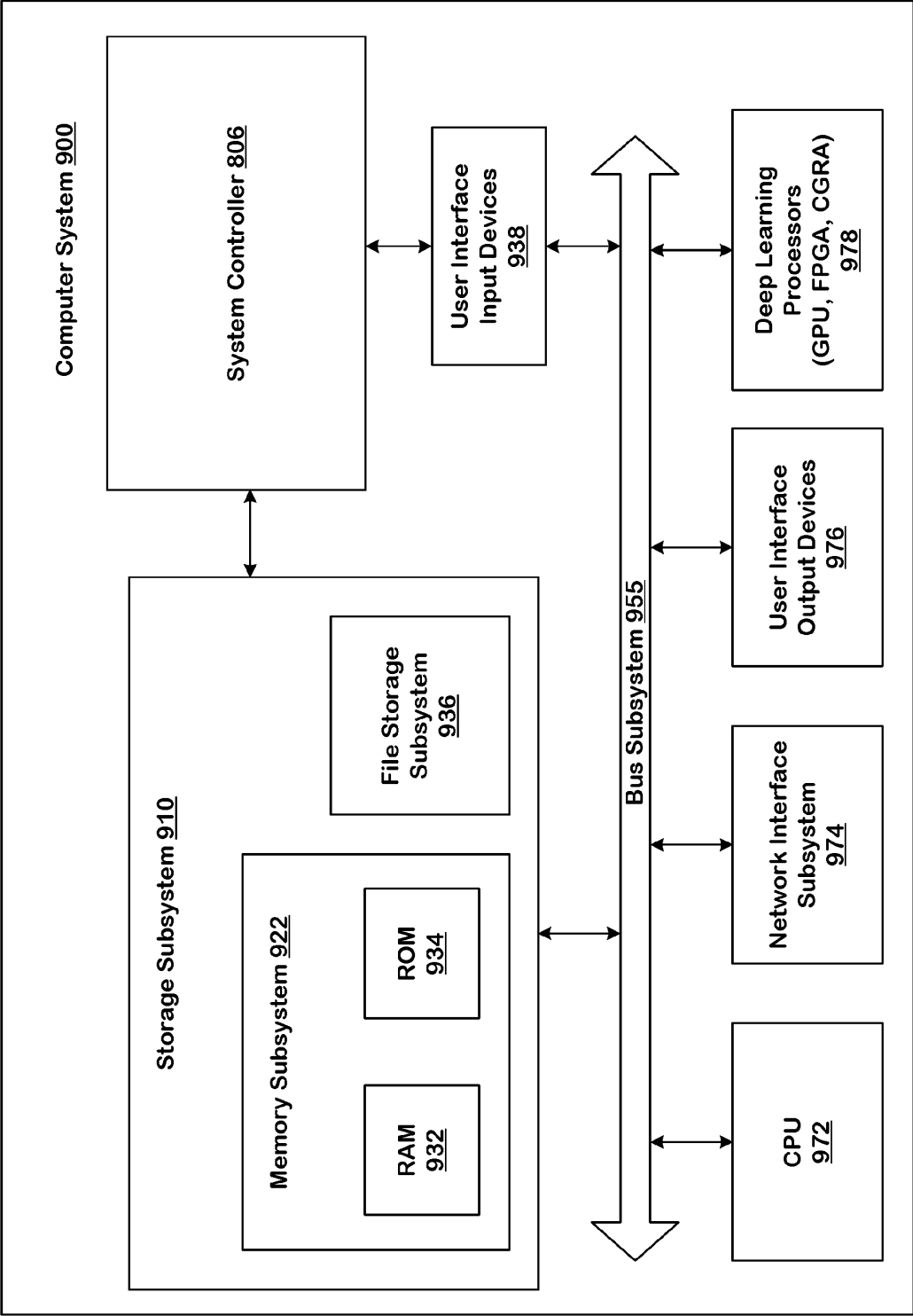


FIG. 9

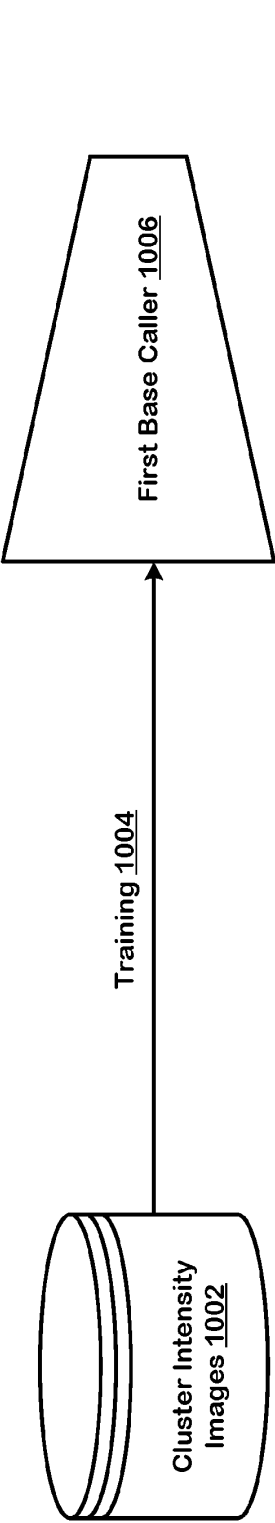


FIG. 10A

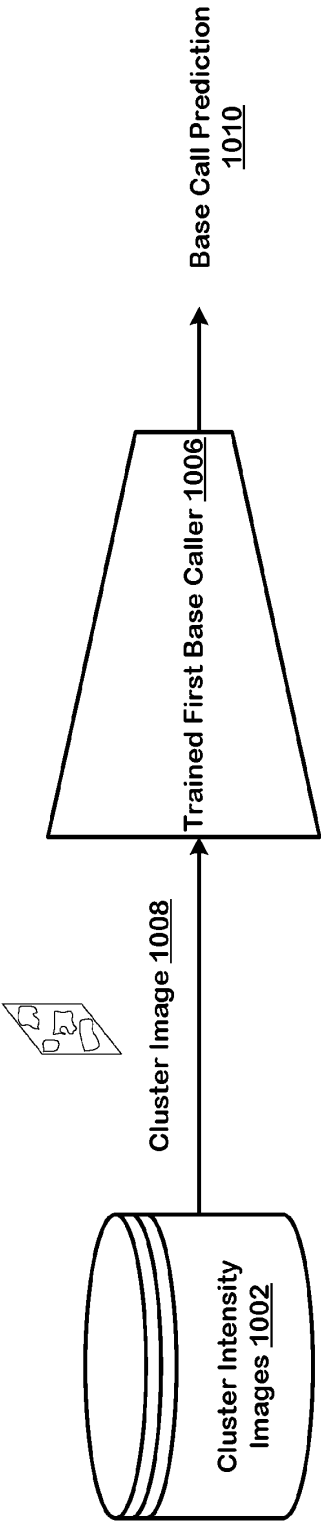


FIG. 10B

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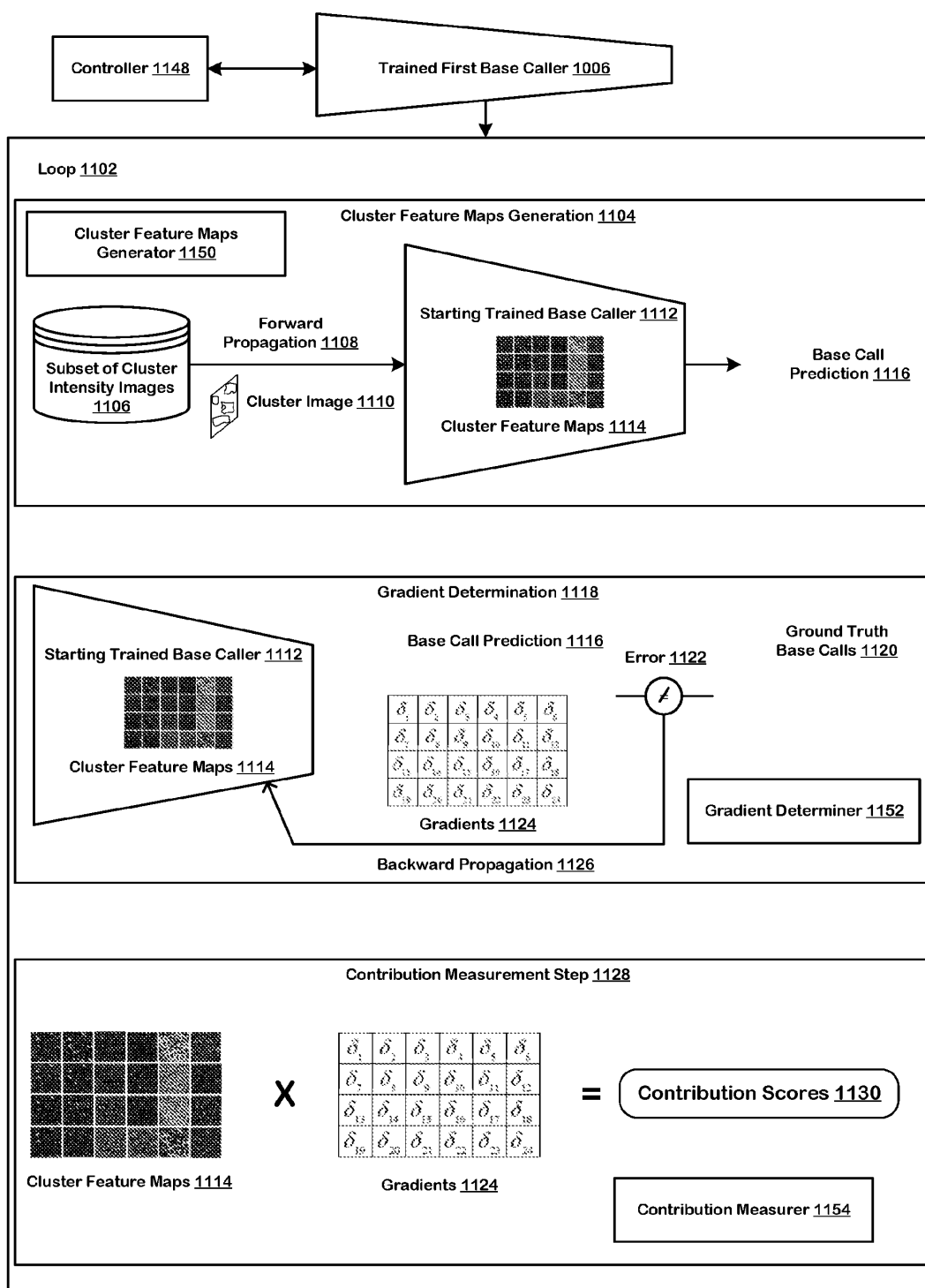


FIG. 11A

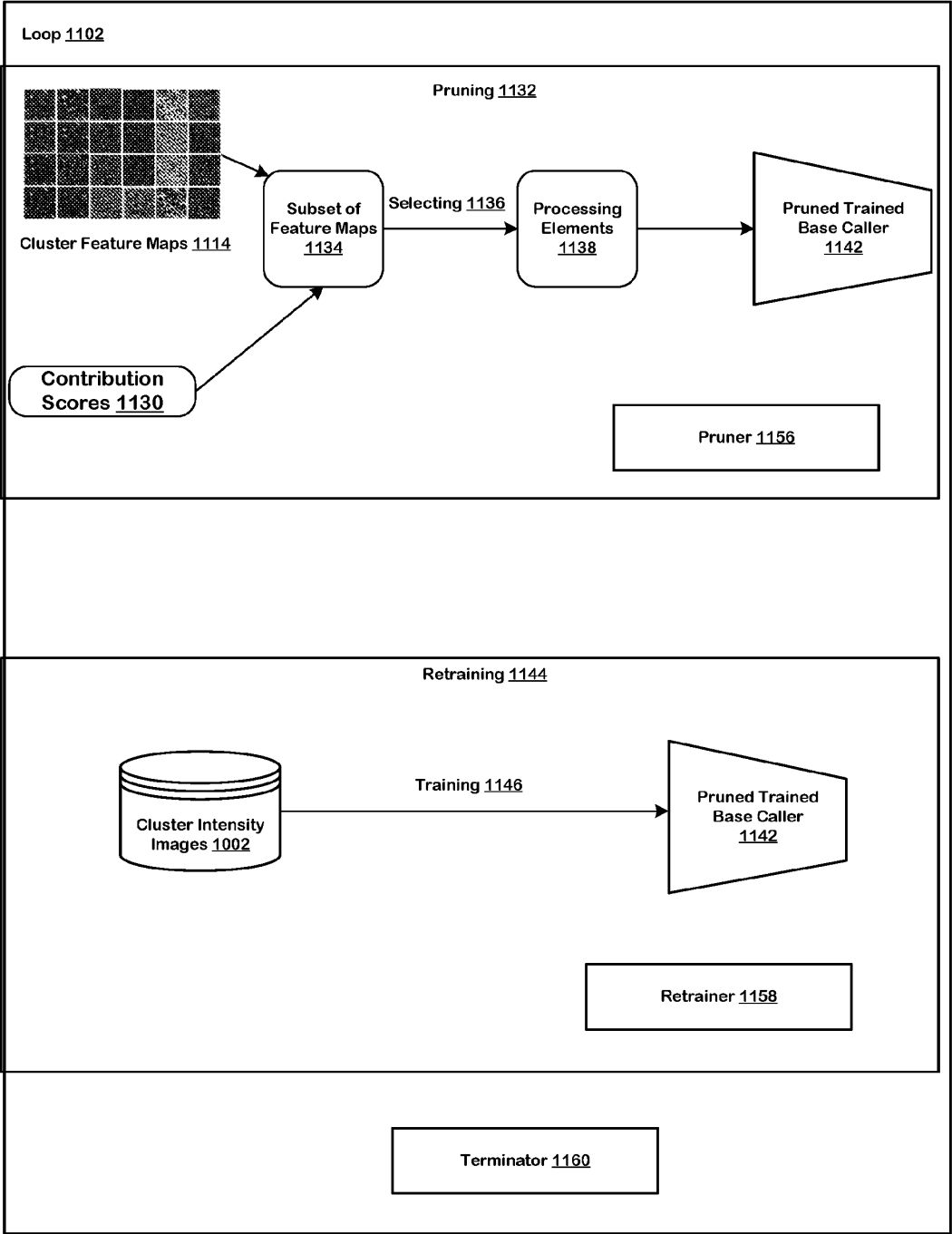


FIG. 11B

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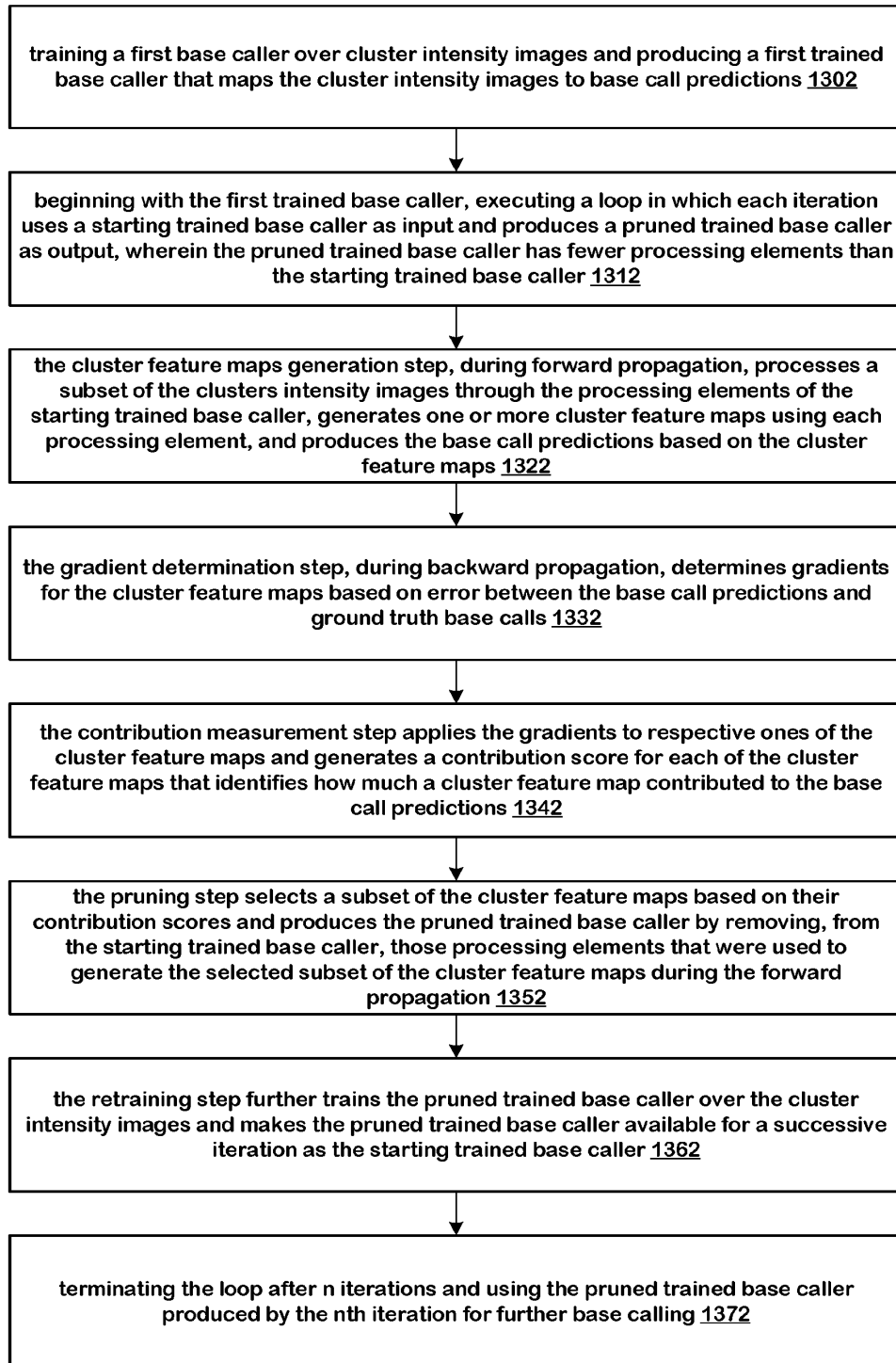


FIG. 13

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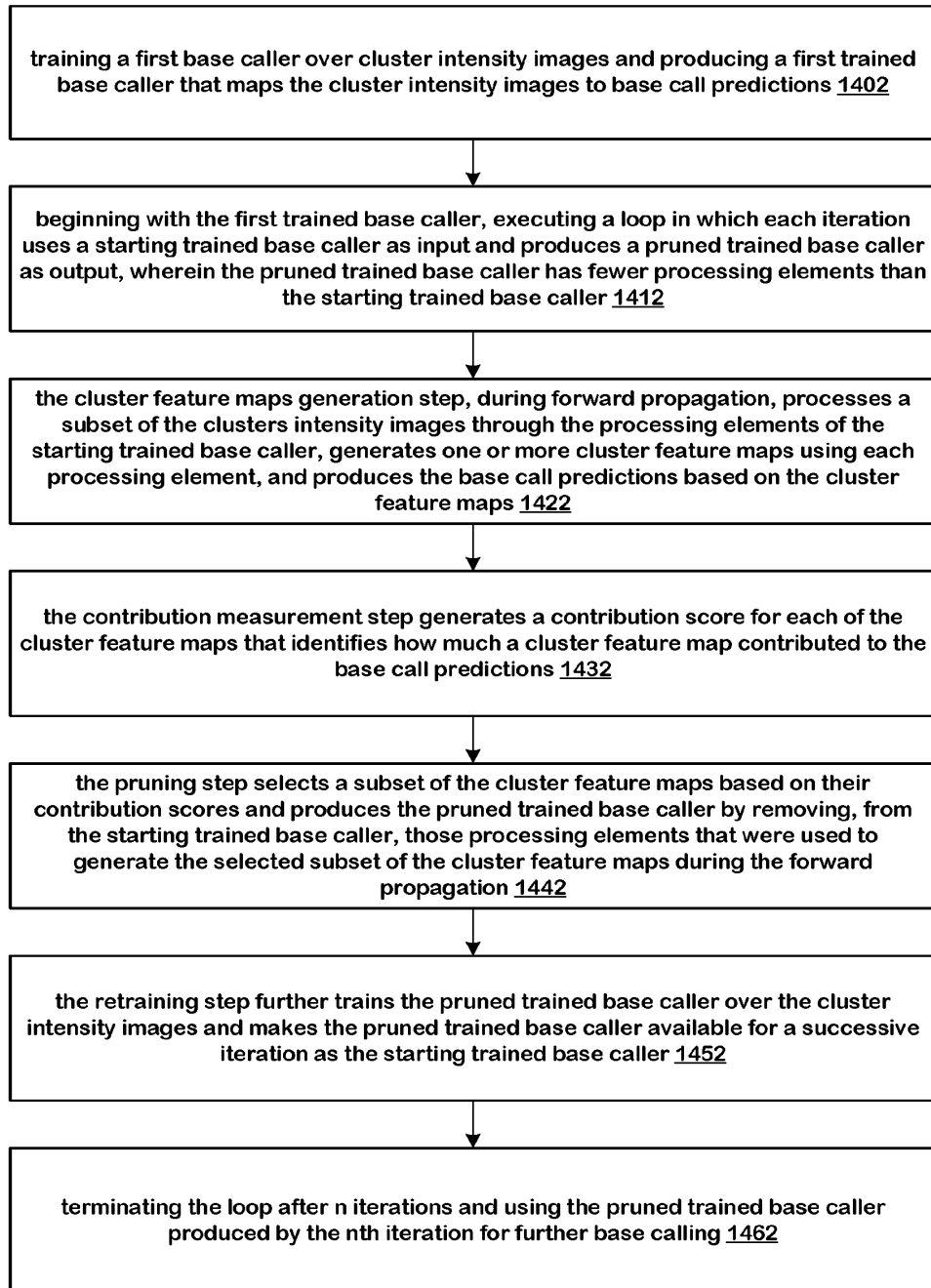


FIG. 14

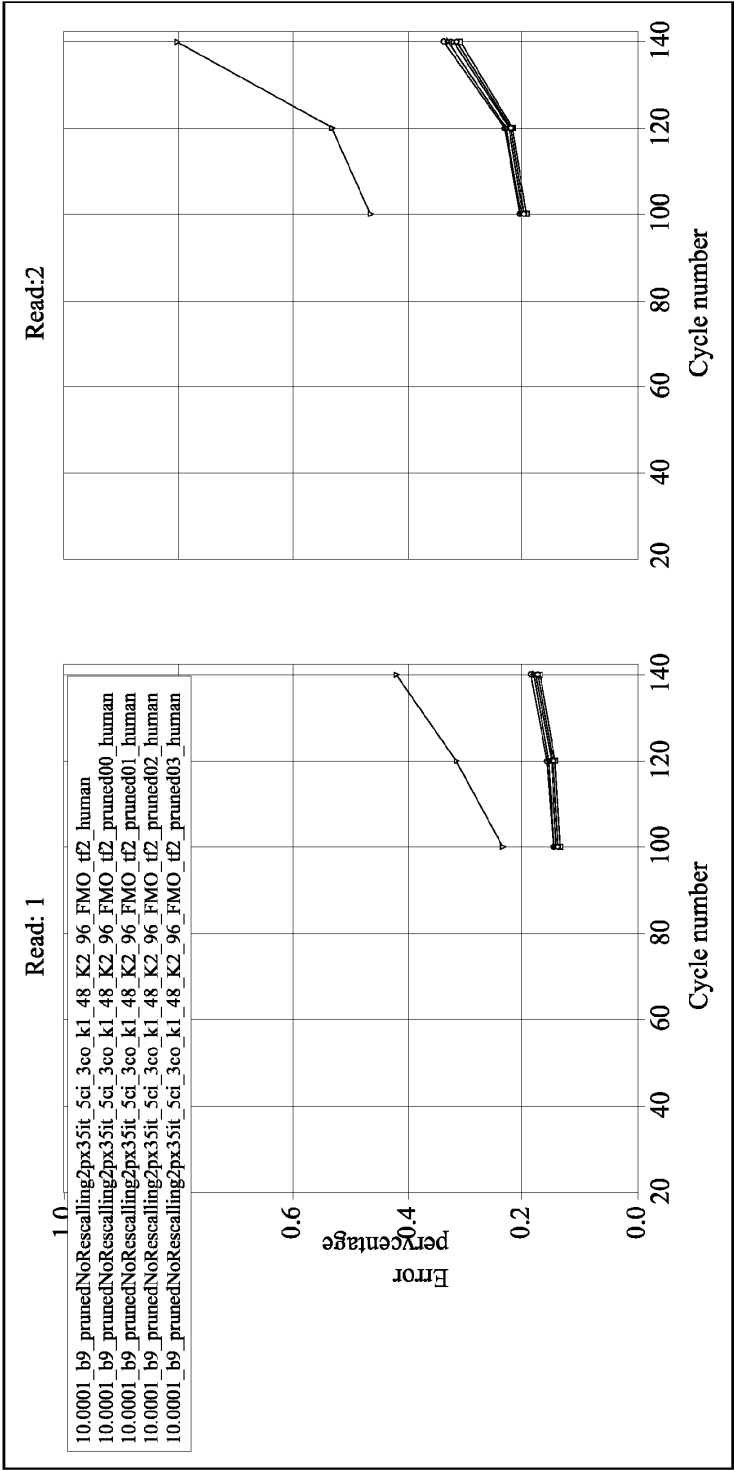


FIG. 15A

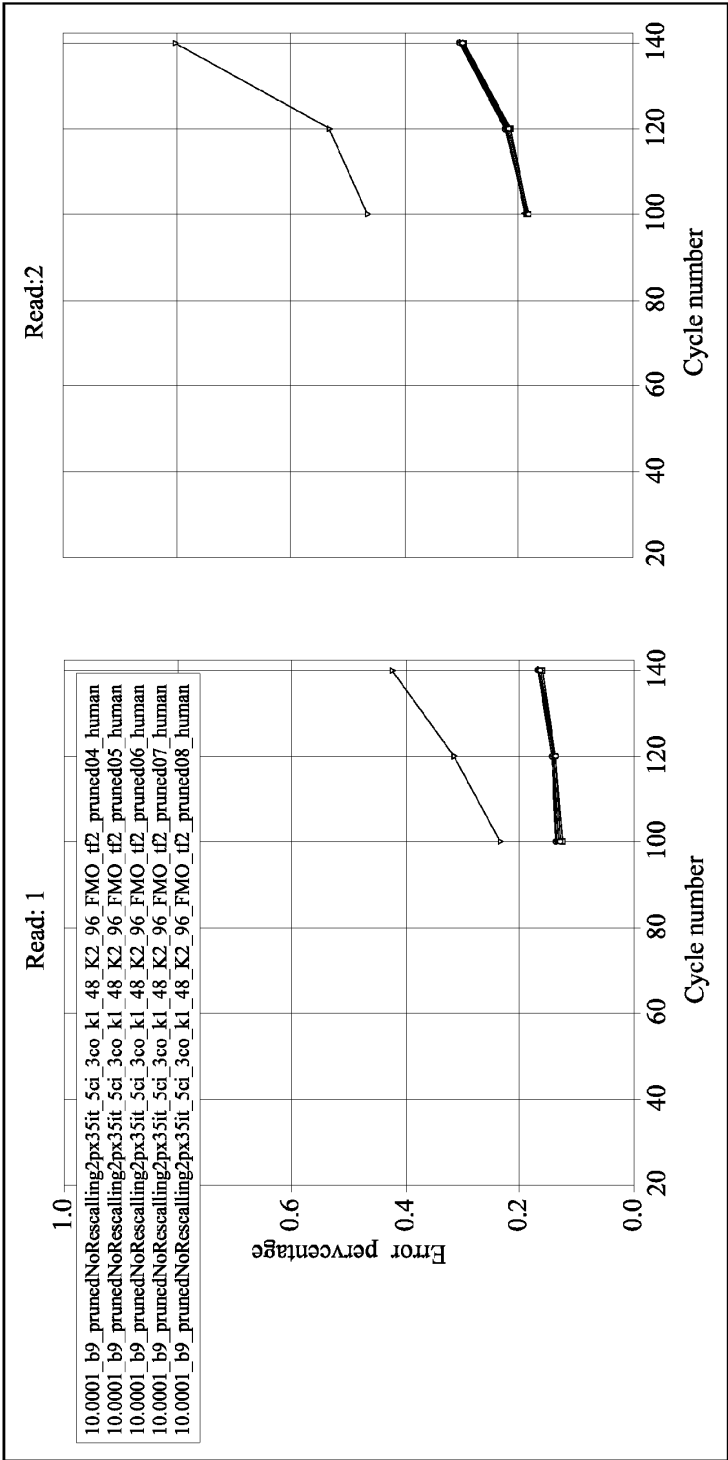


FIG. 15B

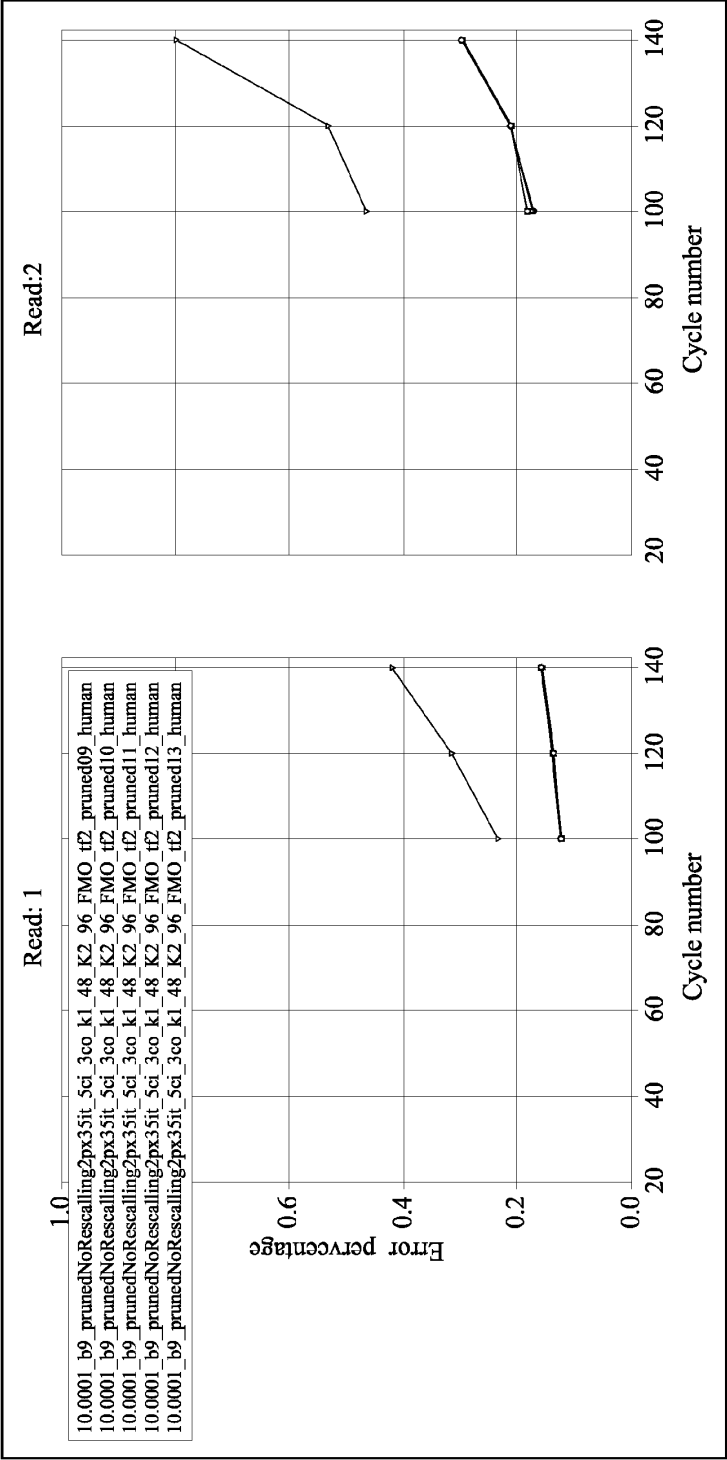


FIG. 15C

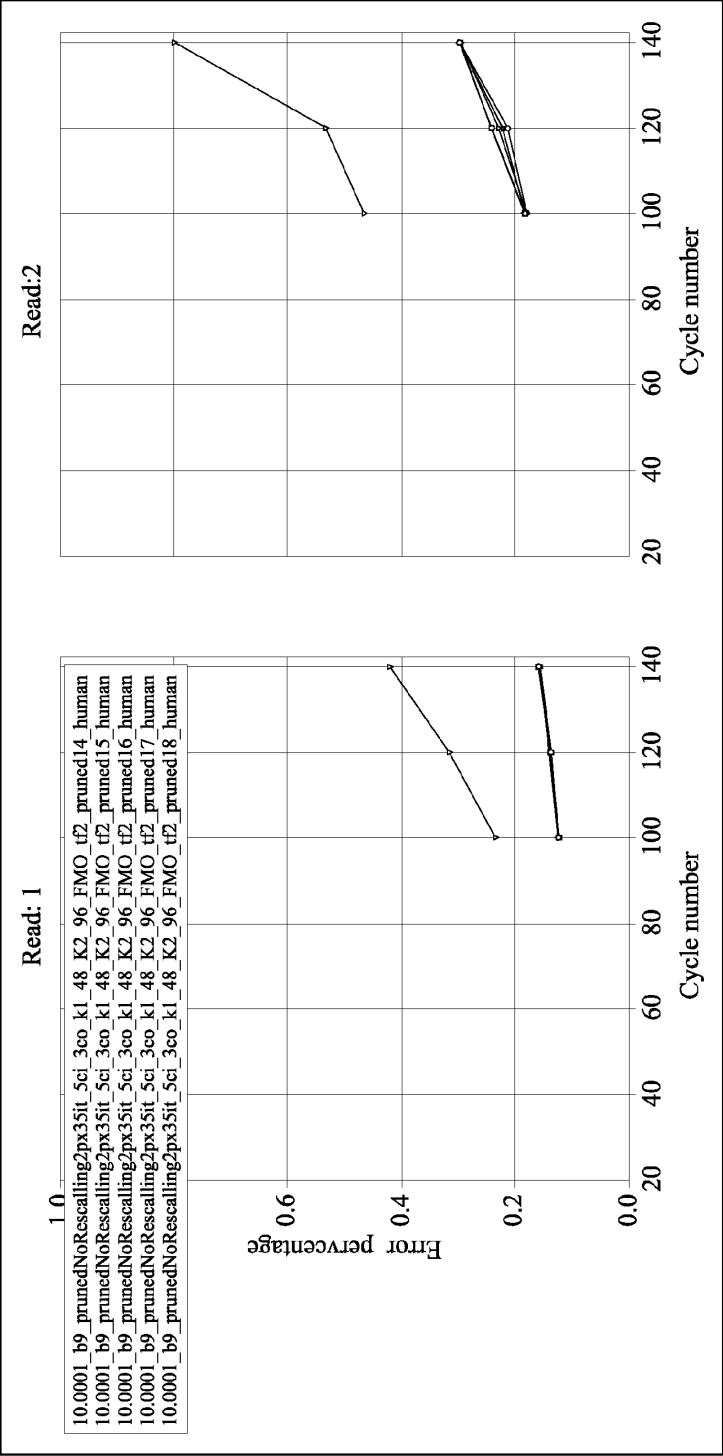


FIG. 15D

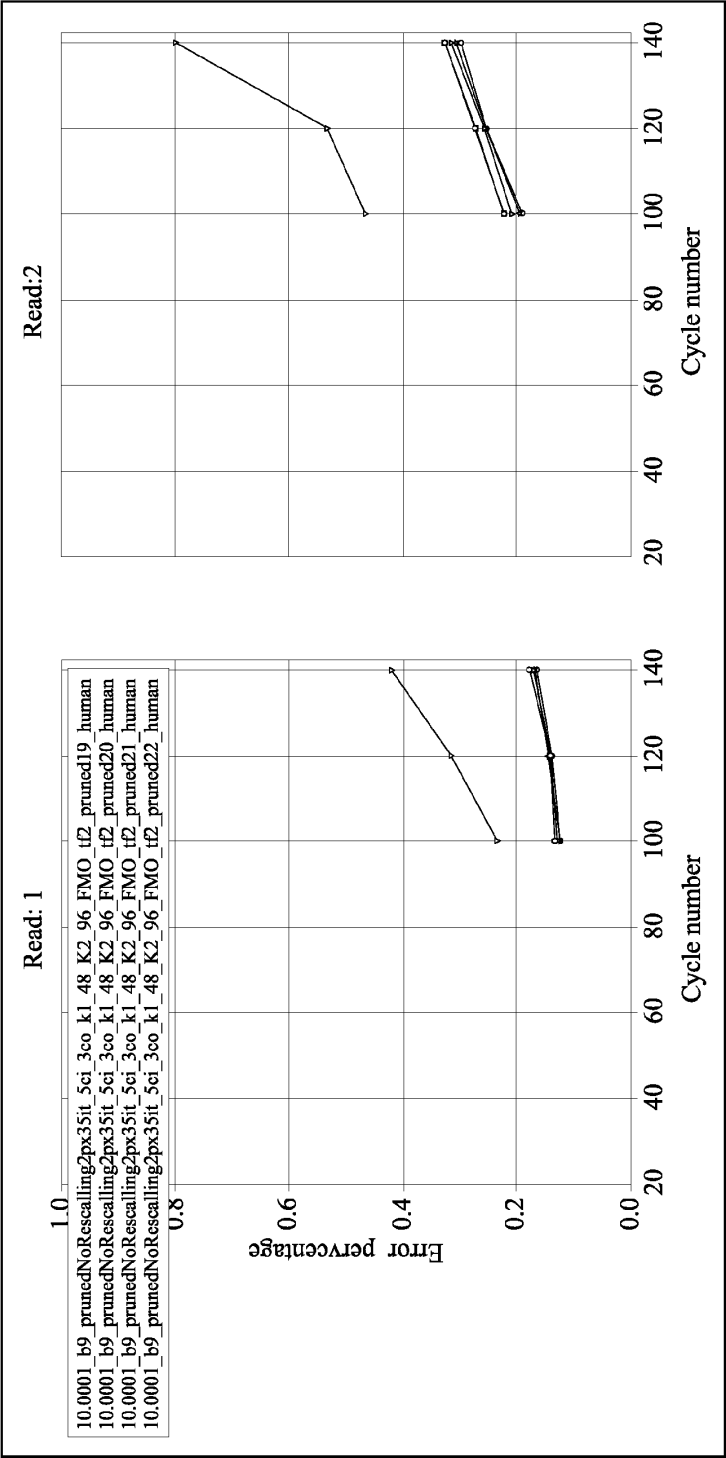


FIG. 15E

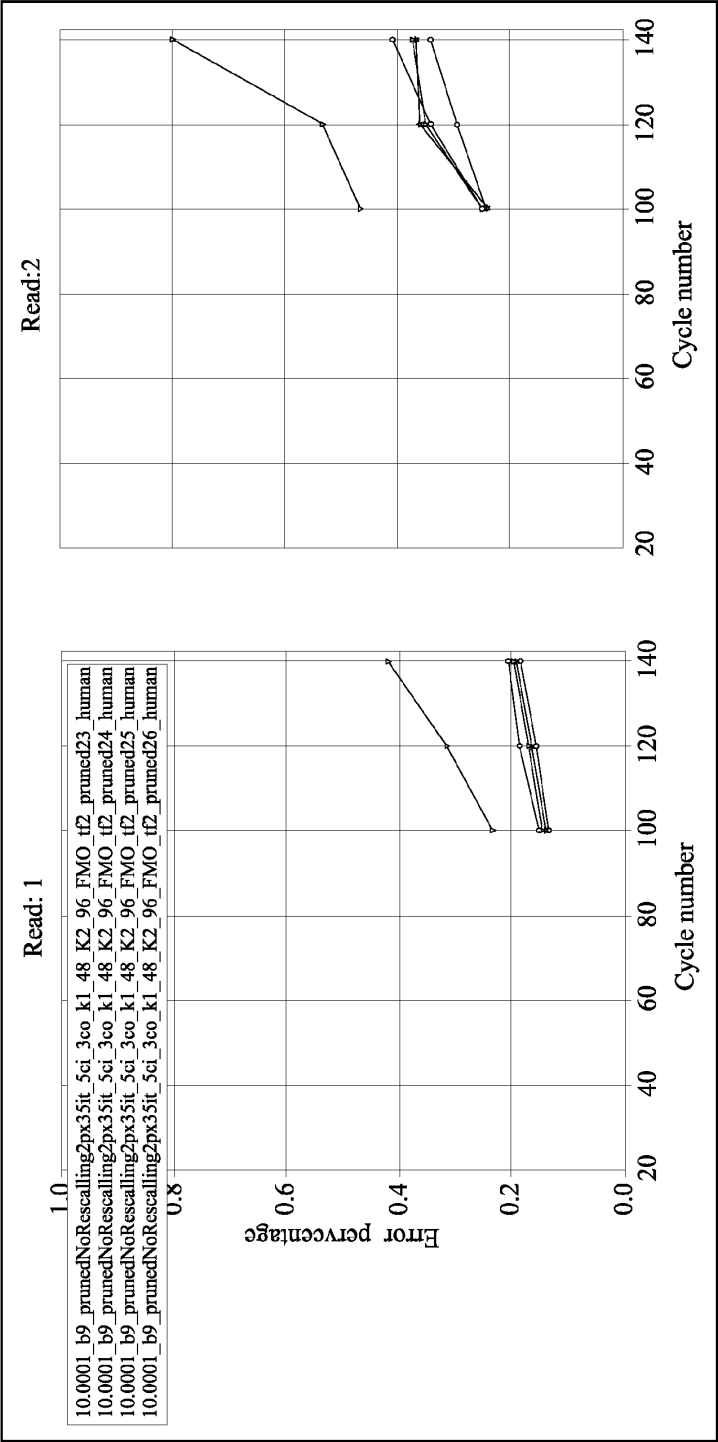


FIG. 15F

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	(None, 5, 115, 4)	0
batch_normalization_1 (BatchNormalization)	(None, 5, 115, 115, 4)	16
conv3d_1 (Conv3D)	(None, 5, 113, 113, 64)	2368
batch_normalization_2 (BatchNormalization)	(None, 5, 113, 113, 64)	256
conv3d_2 (Conv3D)	(None, 5, 111, 111, 64)	36928
batch_normalization_3 (BatchNormalization)	(None, 5, 111, 111, 64)	256
conv3d_3 (Conv3D)	(None, 5, 109, 109, 64)	36928
batch_normalization_4 (BatchNormalization)	(None, 5, 109, 109, 64)	256
conv3d_4 (Conv3D)	(None, 5, 107, 107, 64)	36928
batch_normalization_5 (BatchNormalization)	(None, 5, 107, 107, 64)	256
conv3d_5 (Conv3D)	(None, 5, 105, 105, 64)	36928
batch_normalization_6 (BatchNormalization)	(None, 5, 105, 105, 64)	256
conv3d_6 (Conv3D)	(None, 5, 105, 105, 64)	36928
batch_normalization_7 (BatchNormalization)	(None, 5, 103, 103, 64)	256
conv3d_7 (Conv3D)	(None, 5, 101, 101, 64)	36928
batch_normalization_8 (BatchNormalization)	(None, 5, 101, 101, 64)	256
conv3d_8 (Conv3D)	(None, 3, 101, 101, 64)	12352
batch_normalization_9 (BatchNormalization)	(None, 3, 101, 101, 64)	256
conv3d_9 (Conv3D)	(None, 1, 101, 101, 64)	12352
batch_normalization_10 (BatchNormalization)	(None, 1, 101, 101, 64)	256
conv3d_10 (Conv3D)	(None, 1, 101, 101, 4)	260
activation_1 (Activation)	(None, 1, 101, 101, 4)	0
output0 (Reshape)	(None, 101, 101, 4)	0
Total param : 251, 220		
Trainable params : 250, 060		
Non-trainable params : 1, 160		

FIG. 16

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	(None, 5, 115, 115, 4)	0
batch_normalization_1 (BatchNormalization)	(None, 5, 115, 115, 4)	16
conv3d_1 (Conv3D)	(None, 5, 113, 113, 14)	518
batch_normalization_2 (BatchNormalization)	(None, 5, 113, 113, 14)	56
conv3d_2 (Conv3D)	(None, 5, 111, 111, 14)	1778
batch_normalization_3 (BatchNormalization)	(None, 5, 111, 111, 14)	56
conv3d_3 (Conv3D)	(None, 5, 109, 109, 14)	1778
batch_normalization_4 (BatchNormalization)	(None, 5, 109, 109, 14)	56
conv3d_4 (Conv3D)	(None, 5, 107, 107, 14)	1778
batch_normalization_5 (BatchNormalization)	(None, 5, 107, 107, 14)	56
conv3d_5 (Conv3D)	(None, 5, 105, 105, 14)	1778
batch_normalization_6 (BatchNormalization)	(None, 5, 105, 105, 14)	56
conv3d_6 (Conv3D)	(None, 5, 105, 105, 14)	1778
batch_normalization_7 (BatchNormalization)	(None, 5, 103, 103, 14)	56
conv3d_7 (Conv3D)	(None, 5, 101, 101, 14)	1778
batch_normalization_8 (BatchNormalization)	(None, 5, 101, 101, 14)	56
conv3d_8 (Conv3D)	(None, 3, 101, 101, 14)	602
batch_normalization_9 (BatchNormalization)	(None, 3, 101, 101, 14)	56
conv3d_9 (Conv3D)	(None, 1, 101, 101, 14)	602
batch_normalization_10 (BatchNormalization)	(None, 1, 101, 101, 14)	56
conv3d_10 (Conv3D)	(None, 1, 101, 101, 4)	60
activation_1 (Activation)	(None, 1, 101, 101, 4)	0
output0 (Reshape)	(None, 101, 101, 4)	0
Total param : 251, 220		
Trainable params : 250, 060		
Non-trainable params : 1, 160		

FIG. 17

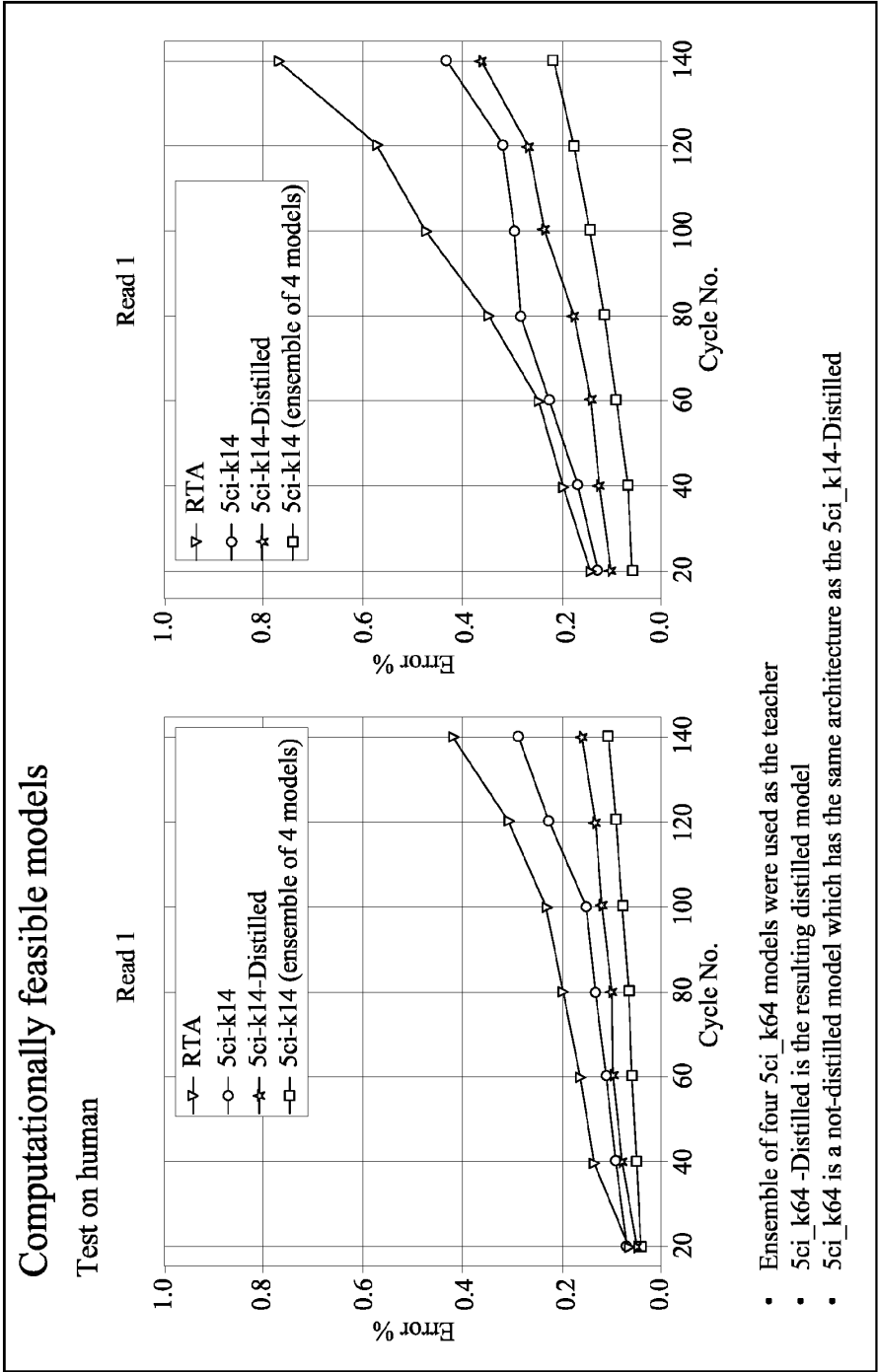


FIG. 18

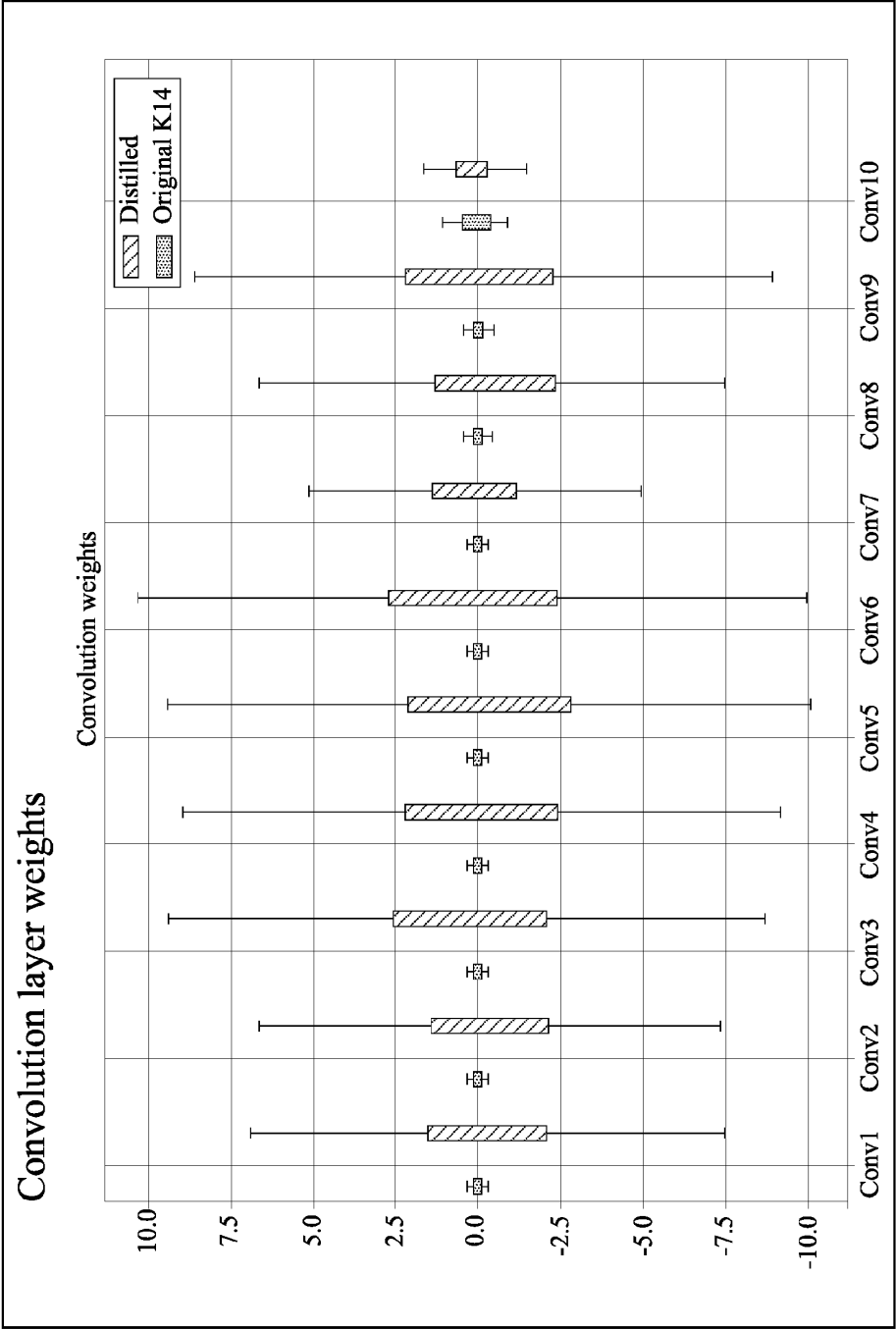


FIG. 19

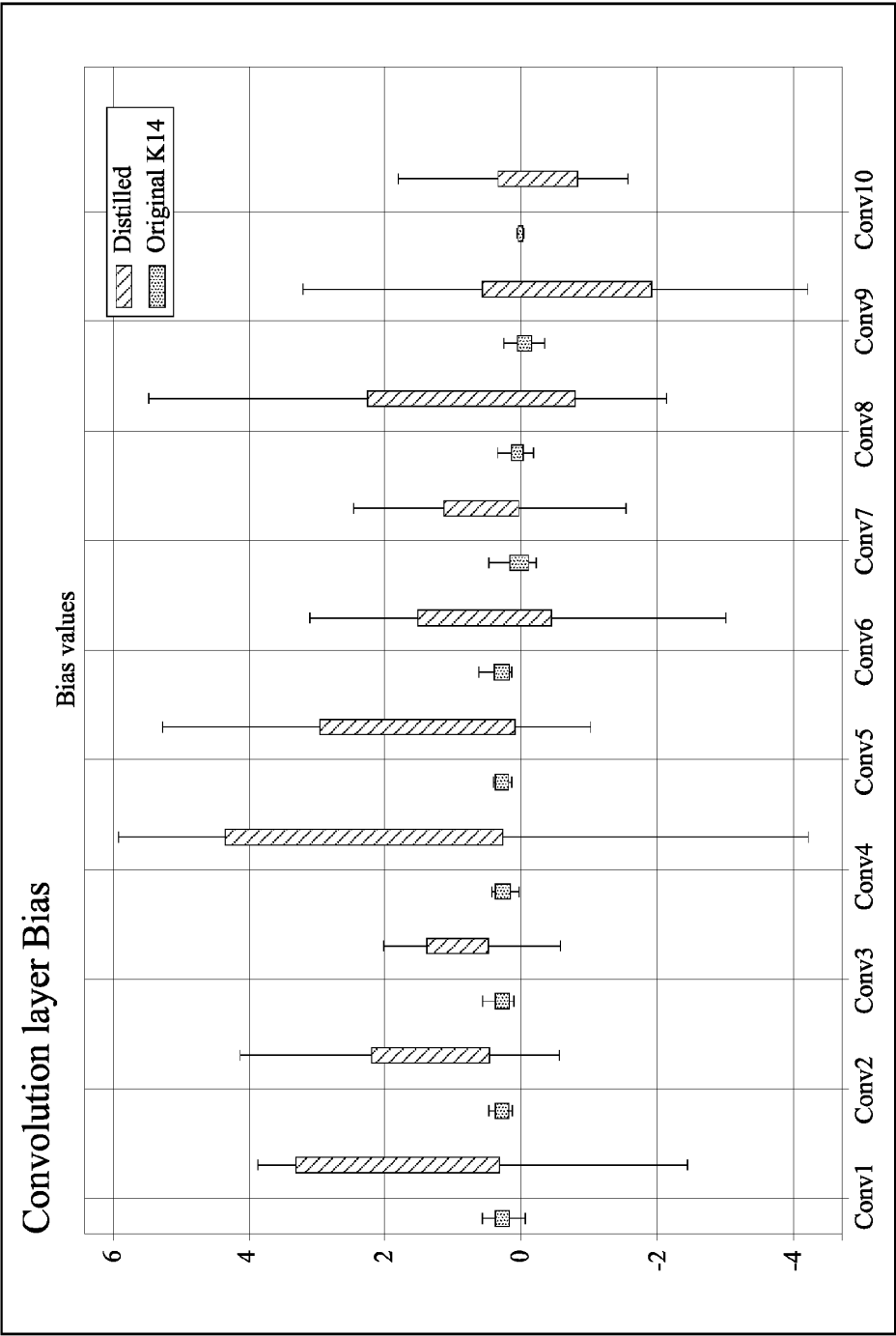


FIG. 20

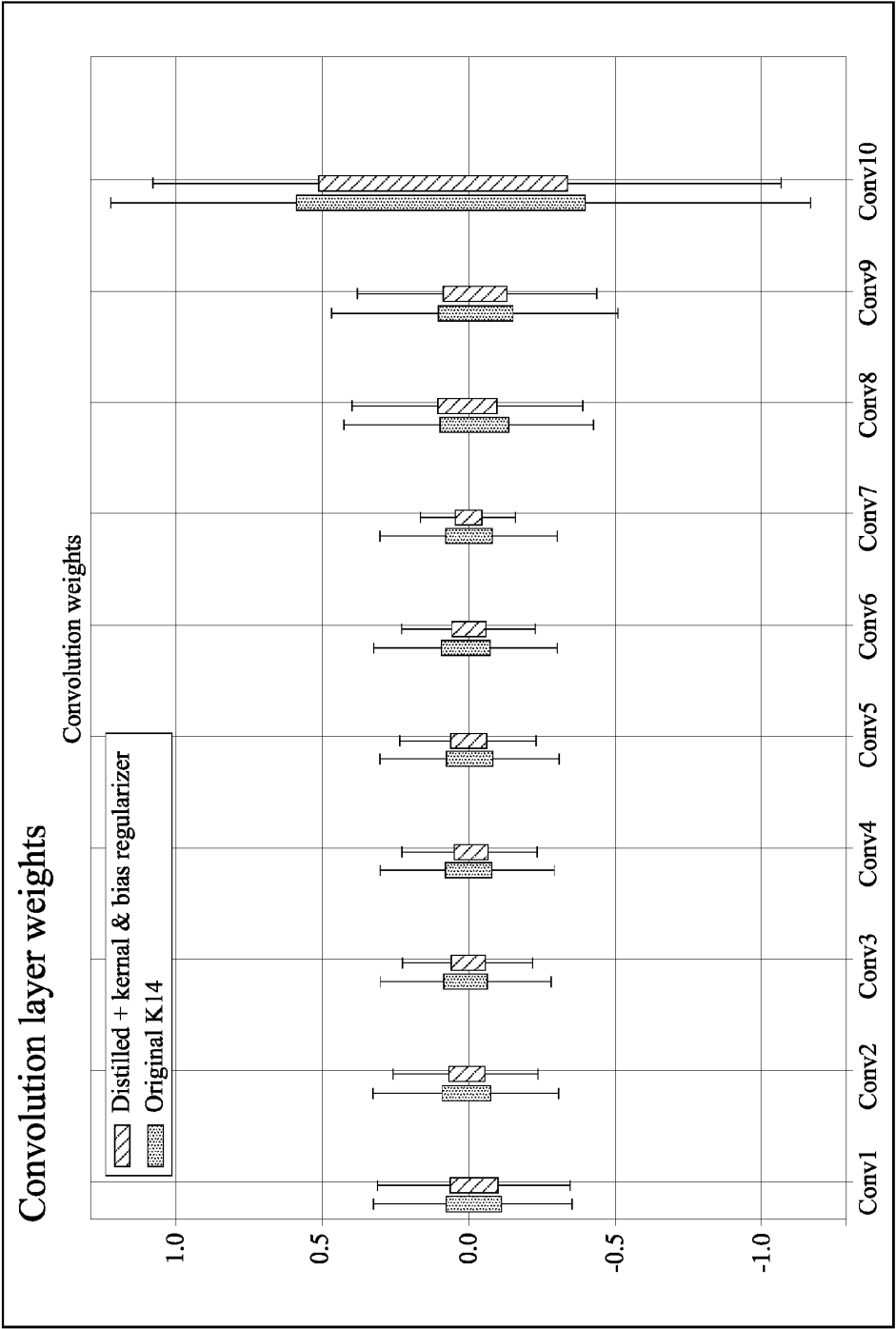


FIG. 21

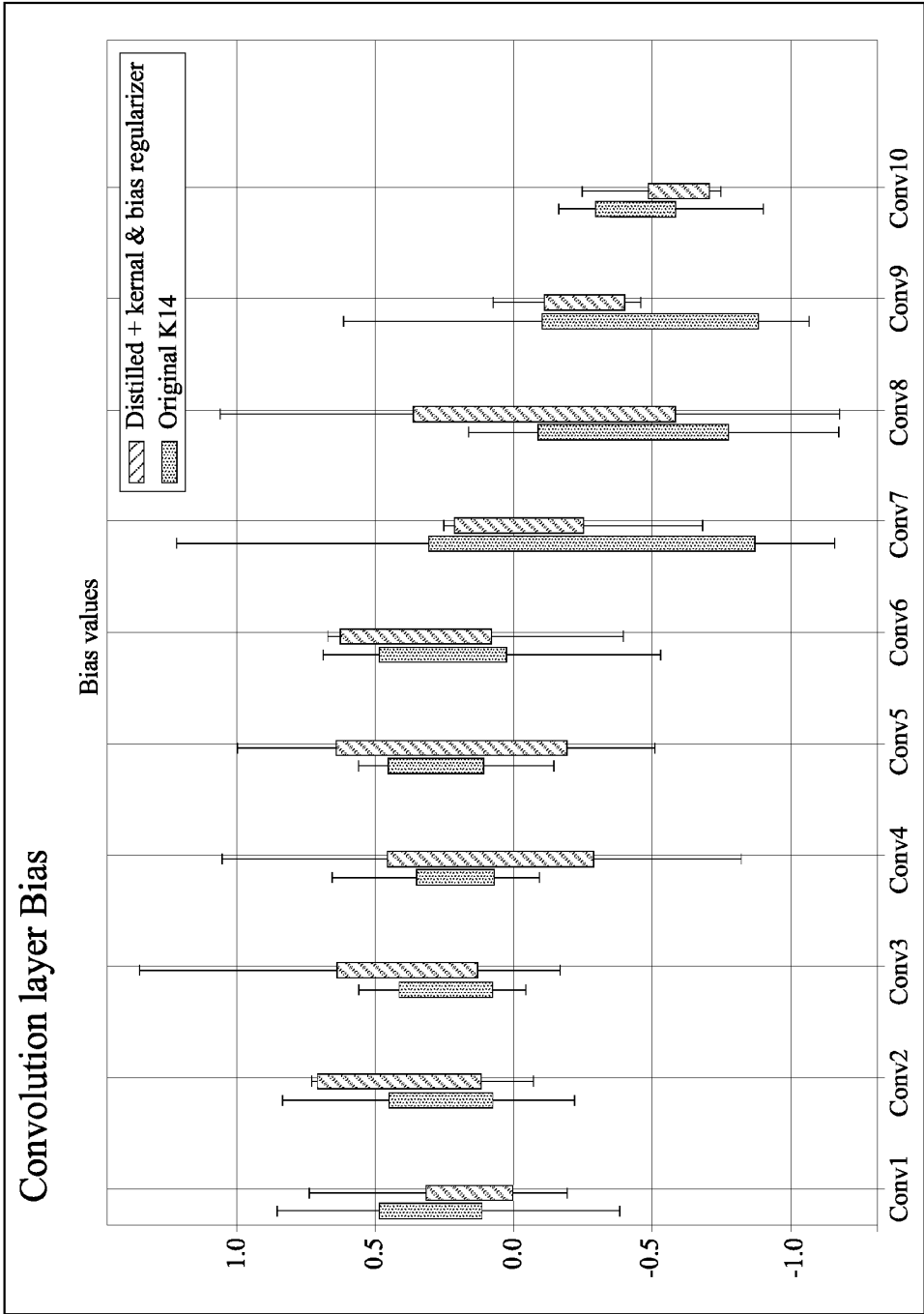


FIG. 22