Abstract. This paper is about three classes of objects: Leonard pairs, Leonard triples, and the modules for a certain algebra $\mathcal{A}$. Let $K$ denote an algebraically closed field of characteristic zero. Let $V$ denote a vector space over $K$ with finite positive dimension. A Leonard pair on $V$ is an ordered pair of linear transformations in $\text{End}(V)$ such that, for each of these transformations, there exists a basis for $V$ with respect to which the matrix representing that transformation is diagonal and the matrix representing the other transformation is irreducible tridiagonal. There are families of Leonard pairs said to be totally bipartite and totally almost bipartite. A Leonard pair is said to be totally B/AB whenever it is totally bipartite or totally almost bipartite. The notion of a Leonard triple and the corresponding notion of totally B/AB are similarly defined. There are families of Leonard pairs and Leonard triples said to have Bannai/Ito type. This paper concerns totally B/AB Leonard pairs and Leonard triples of Bannai/Ito type.

Let $\mathcal{A}$ denote the unital associative $K$-algebra defined by generators $x, y, z$ and relations

$$xy + yx = 2z, \quad yz + zy = 2x, \quad zx + xz = 2y.$$

The algebra $\mathcal{A}$ has a presentation involving generators $x, y$ and relations

$$x^2y + 2yxx + yx^2 = 4y, \quad y^2 + 2yxy + xy^2 = 4x.$$

This paper obtains the following results. It classifies up to isomorphism the totally B/AB Leonard pairs of Bannai/Ito type, the totally B/AB Leonard triples of Bannai/Ito type, and the finite-dimensional irreducible $\mathcal{A}$-modules. It shows show that these three classes of objects are essentially in one-to-one correspondence, and describes these correspondences in detail.

Key words. Leonard pair, Leonard triple, Bannai/Ito polynomials, Anticommutator spin algebra.

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